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Is Mass Society a Threat to Representative Democracy? Revisiting David Riesman's "Other Directed Character"

Sulkunen, Pekka

2012

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Shnnd Vxoxqhq⁴

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Dewudf w

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v x s s r u h u 1 G h f d q l q j h d f v r u d o s d u f l s d m r q / u v h r i s r s x d w u l j k v e z l a j s d u l h v /
f r q v l a j h q w f r d d v r q v / s h u r q d d } h g h d f v r u d o v x f f h w d a g v f d a g d a g u y h q s r d v l f v
l q g l f d h d f u l v l q u h s u h v h q v m y h g h p r f u d f | 1 P d w v r f l h v / v k h r u h v d i v n u v k h
V h f r a g Z r u a g Z d u s u g l f v n g d g h f d q h r i g h p r f u d f | r q v k h e d v r i
k r p r j h q l v d m r q r i p d w f r q v x p s v l r q v r f l h v h v 1 V k h v k u h d w z d v v h q v r l q y r q y h
v r u d v u d d a g u d v / f r p e l q h g z l v k e x u h d x f u d f | v h u y l a j v k h l q v u h w w r i h d v h v 1 V k l v
s d s h u h { d p l q h v v k h x a g h u d l a j s u h v x s s r v l r q v r i p d w v r f l h v / v k h r u / d a g
d j x h v v k d w v k h k r p r j h q l v l d j x p h q w l v l q v x i i l f l h q w v i l w v k h u h d d v h v 1
l r a e z l a j G d y l g U l h v p d q / l w l v d j x h g v k d w k h r v k h u G l u h f v n g f k d u d f v n u j u r z v
i u r p x q w a d e h l q v u h w j u r x s l g h q v u h v / e x w l w g h u h u p l q d q w l v q r w d p h q h w e x w
d j h a f | d a g v k h u i r u h g l i i h u h a f h 1 V v k d y h d j h a f | l v w r u l h q w q h v h o v r v k h u v d v
d v h o / d v x q l t x h / v h s d u d h d a g d x w r q r p r x v x e r h f v l V k l v l v y l q g l f d v n g e l v h q g v
l q s x e d f d g p l q l w u d m r q v l a f h v k h 4 < 3 v / z k l f k v u h v f l v j h q v O v h o f r q w r d
d x w r q r p | d a g s d u q h u k l s u d v k h u v k d q f r q i r u p l v 1 S r d v l f d o g l v s x v l v d u v h
d u r x a g f r q w a g l f v r q v e h v z h q g l i i h u h a f h d a g d x w r q r p | l q v r f l h v h v z k h u h
d j h a f | l v d s u q f l s d h r i m w l i f d m r q 1 X q l y h u d o d x w r q r p | u h t x l u h k r p r j h q l v l
e x w d j h a f | v u h v h v g l i i h u h a f h d a g x q l t x h q h w 1

N h | z r u g v = g h p r f u d f | / p d w v r f l h v / s r d v l f d o u h s u h v h q v m y h q / v r u d v u d d a g l v p /
G d y l g U l h v p d q

5345 K l s d m d S u h w
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Wk gh p lvh ri uhsuhvqhvmlyh ghp rf udf | kdv ehq suhglf vng vqf h
 vkh yhu eluk ri vkh lghd lq vkh hdu 4<* f hqxu / dag
 vshf l d d i vlu lw lq vlxv qv z h u x q l y h u d d h v e d e d v k h g l q
 Z h w l u q f r x q u l h v e l v k h h q g r i v k h V h f r q g Z r u g Z d u f 1 U h s u h v q h v m l y h
 g h p r f u d f | l v e d v h g r q v k h s u q f l s d h v k d w x e r t h f w r i d s r d v l f d o v l w h p /
 h j 1 d q d m r q / q d v u d d d k d y h z k d w U r x w h d x f d a n g d j h q h u d o z l a o
 y r a q w j • q u d d h / z k l f k f d q e h d u l f x a d v n g l q d j u h p h q w d a g
 f r p s u r p l v h v v k u r x j k g h e d m v d a g y r v n v / l g h d d l q w z q p h h m a j v r i
 v p d a o v r f l h m h v l q a d j h v r f l h m h v h d f v n g s h u r q v d u h h f s h f v n g w
 u h s u h v q h v k h s r d v l f d o f r q v l x x h q f | l q d j l v a d m y h d a g d g p l q l w a d m y h
 e r g l h v w i r u p x a d m d a g l p s d h p h q w v k h j h q h u d o z l a o l q a e z d a g l w
 d s s d f d m r q 1 V k h g h p r f u d f s u r e d h p / d w l w f r u h l v k r z w j x d u d q v l h
 v k d w v k h s r d f | r x v r p h v i u r p q h j r v d m r q v d p r q j h d f v n g
 u h s u h v q h v m l y h v f r u h v s r q g w v k h j h q h u d o z l a o r i v k h h d f v r u d m r 1

Vkh gh p r f u d f s u r e d h p j l y h v d v h w v k h q h n g i r u e r v k w x w d a g
 f r q w r d Q r h d f v r u d o g h p r f u d f | l v s r v l e d h z l v k r x w x w w e x w l w y d u h v l q
 g h j u h d a g h f v n q v l r q 1 Q r z w x w w d n d g v w z k d w S i h u h U r v d q y d a o q
 +533; , f d a o r u j d a l } h g g l w x w w k l j k s u h f l v r q d a g k l h u d f k | r i u d h v d a g
 f r q w r a / z k l f k l v y h l h f s h q v l y h d a g f r x q v l u s u r g x f v l y h i r u i r u p x a d m a j
 v k h f r q v l n q w r i v k h j h q h u d o z l a o d a g l p s d h p h q w l a j l v r 1 R q v k h r v k h u k d a g /
 x q d p l v n g w x w w d n d g v w v n u r u r i v k h h d f v l V k h u h i r u h r j d a l } h g v x v s l f r q
 k d v e h q d f r q f h u q i r u s r d v l f d o v k h r u w v l q f h v k h e h j l q l q a j v r i
 u h s u h v q h v m l y h g h p r f u d f | d w k h v l p h r i v k h l u h q f k U h y r o x v r q 1

Vk h r u h v r i g h p r f u d f | k d y h v x j j h w n g v z r u j l p h v / d e h u d o d a g
 g h p r f u d f +P r x i i h / 5338, / v k d w p d l e h d s s d h g w j x d u d q v l h v k d w s r z h u
 u h s u h v q h v k h z l a o r i v k h s h r s d h 1 V k h i l u w v k h r u l } h g e l P r q v l m t x l h x l q
 v k h h d u 4<* f h q x u / w a l y h v w h q v x u h v k d w s r z h u k d a g h g r y h u w v k h
 h d v l l v f r q w r a n g e l d f r x q v l u s r z h u f 1 L v w u h w h v v k h l p s r u d a f h r i
 f r q v l x v l r q d o s u r f h g x u h / i d l u d a g i u h u j x a d u h d f v l r q v / v k h u r d h r i
 f r x u w / d a g v a d q v s d u h q v u x d e d v n g j r y h u d a f h 1 V k l v y l h z r i g h p r f u d f
 f r q w r o k d v e h q u h s u h v q h v n g e l d e h u d o s r d v l f d o v k h r u w v x f k d v U r e h u w
 G d k o +4<94, / V h j p r x u P 1 O l s v h w +4<93, / d a g p d a l r v k h u r 1 V k h v h f r q g /
 Q g h p r f u d f Ô v s h r i f r q w r o d l p v w h q v x u h v k d w v k h h d v l n h h s v l w
 f r p p l v p h q w w l w h d f v r u d m / h v s h f l d d n h s l a j l w r z q v h o d q v l u h w l q
 d a h 1 Q r f r q v l x v l r q d o j x d u d q v l h v d u h v x i i l f l h q w w v d m v i | v k l v d v s h f w r i
 g h p r f u d f v x v s l f r q 1 L w u h t x l u h v f r q v l q x r x v q h j r v d m r q / v x s h y l v l r q /

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uhlvwaf h/ dag nqj phqwe| Qkh shrschÔ ri vkrvh lq srz hul VKlv
dssurdfk kdv ehq surprvng el Mij hq Kdehup dv +4<<9,/ Vh| ad
Ehqkdele +4<<9,/ dag Slhuh Urvdqydor q klp vho +533; ,/ dag lwlv vkh
irxqgdwlr q ri z kdwlvf dach ghdehualygh ghp rf udf | +Howhu/ 4<< , 1

Wgd| / qhlvkhudehudoqr ughp rf udf p hf kdqlvp vri frqwr ovnhp w
j xlduqvlh vkdwsludp hqvulj sr dlvf v wldqvdm lqvlhwoedvhg j urxs z laov
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z dv dulf xadvhg el Dp huf dq p dwOrf lhw/ vkhruvw lq vkh lp p hgl dlv
sr woz du ghf dghv dag frqlqxhg lq Hxurshdq sr wpr ghug vrfldovkhr u 1
VKh p dwOrf lhw/ vkhlv kdv dij xhg vkdwli dag z khq/ iruwrph udr q/
vkh sr dlvf do frpp xqlvlhv vkdw sr dlvf ldqv uhsuhvqwg lwsdm ru duh
eafnhg iurp frqwr adaj vkhlu hqyr| v lq srz hu/ vkh p hgl dlvaj urd ri
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frp elqhg z lvk glwvwxwlvq vkh hdlv h{ suhvng el uj kvoz laj sr sxdvw
pryhphqwa> pruhryhu/ udlr qdo lqvlhww dulf xadwlr q lv uhsaf hg el
lqglylxd} hg p hgl dlvhqlr q w vj p erdf prudoqg hp rvlr qdo lwxhv/
dag uhdosrz hu idov lqwr vkh lqylvedh kdqgv ri d srz hu hdlv1 Lq vkh
z ruwfdv/ vkh sr dlvf dorughu idov lqwr vkh kdqgv ri vrvdvdldq ucd1
VKlv vnhp v w kdyh kdsshqhg vlqf h vkh 4<; 3v/ li el vrvdvdldq ucd z h
xqghuwdag d khj hp rql ri qhr dehudo sr dlvf v vkdwgr hv qr wvnhp w eh
p xfk lqj oxhf hg el vkh sr dlvf dof r dvlr qv lq j ryhuq hqw1 Lq vkr u/ vkh
lwshv frqf huqlaj uhsuhvqwdygh ghp rf udf | lq p dv vrf lhw/ duh irxulq
qxp eh=41 Ghf dqlaj yrvluwxuqrxw dag ulvaj uj kvoz laj sr sxdvp >51
Lqf dsdf lhw/ ri vkh sr dlvf do vj vnhp w vxuq j urxs z laov lqwr sr dlvf do
dj hqgdv/ z lvk vkh frqvht xhqwp hgl dlv} dlv q dag prudd} dlv q ri sr dlvf v>
61 Qhz irup vri hdlvOgulyhq j ryhuqdf h uhsaf h sxedf dgp lqlwudwlr q
vxshyvlvhg el sludp hqvulj erglvh dag frxuw>71 Hf wldsludp hqvulj
vxshyvlr q ri srz huehfrp hv er vk pruh lp sr wldqwdag dhw hiilf l hqwdv
vkh vdp h vlp h1

Dchw glvp doylhz +Ur vldqydor q/ 533; , dij xhv vkdwfr qwr ori srz hu
f dq dag gr hv vnh r vkh uir up v ehvghv vkh surf hgxudo chj l vlp df | ri vkh
hdf w udo dssdudwv1 Frxqvlwghp rf udf | / dv kh f dlv lwr shudlv gluhf vq
vkr xj k vxuyhl adf h/ frqwr odag nqj p hqv1 Rvkhuyhuir qv ri vkh vylhz
kdyh ehq surqrxhf hg lq gliihqwir up v el Dp huf dq Frp p xqlvdldqv
vxfk dv Ehaok hwdol +4<; 8,/ Hylr ql +4<< ,/ Sxvqdp +5333, dag r vkhur1
Dqr vkhu f ulvf doylhz kdv ehq sxwir uz dug el Fkdqvdop Rxi h +5338,/

; Vxoxqhq OD vkuhdwv uhsuhvqvmlyh ghp r f udf |

z kr kdv dj xhg vkdwghi qv h ri ghp r f udf | lqylv dv d q h f h w l v l v u h v l v d f h r u d j r q l w l f f r q i d f v d z l v k q h r d e h u d k h j h p r q l / r x w l g h d q g e h l r q g s l u d d p h q v l l q v l v x v l r q v l

Vx f k f u l f d o d w h w p h q w d q g f r x q v l u d w h w p h q w f d q e h v x s s r u l g z l v k h p s l u f d o h y l g h q f h / e x w v k h l q h y h u k h d w i d o v h f s a d l q z k l u s u h v h q v m l y h g h p r f u d f | l v q r w x s v l w s u r p l v h w g d l / l i l w h y h u z d v l Q r u g r v k h l h f s a d l q z k l / k r z / l q z k d w i r u p / d q g i r u z k d w s x s r v h f r x q v l u d s r z h u h l v k h u g r h v r u g r h v q r w j h w p r e l d } h g v e u d q j v k h h d v l e d f n l q v d q h / d q g l q z k d w z d l h w h q v l d o l q v l u h w l q v r f l h v l d u h r u d u h q r w u s u h v h q v l g l q s r d w l f d o g h f l v l r q v l V k h l v h h g h p r f u d f | r q d d v v r f l h v l d f d s d f l v l v f r q v r o s r z h u h d v l v l V v x q g h u w d q g z k d v u s u h v h q v m l y h g h p r f u d f | l v / d q g k r z l w g r h v r u g r h v q r w i x q f v l r q d v v k h p h g l d w r u e h v z h h q s r d w l f d o s r z h u d q g v r f l h v l / z h v k r x a g a r n d w k r z l w l v h p e h g g h g l q v r f l h v l d w x f v x u h v r i n a w l i l f d l r q l q d e u r d g h u d q g k l w r u f d o v h q v h l

P d w v r f l h v l v k h r u h v v k h p v h y h v d a h d g l l q f o x g h g l q v l u h w l q j h d h p h q w v v k l v h i i h f w d v L z l a o v k r z u j d u g l a j G d y l g U l h v p d q d g l d j q r v l v r i v k h q h z p l g g d h f a d w f r q v x p h u v r f l h v l 1 H p e h g g l a j v k h v h h d h p h q w l q v k h v k h r u l r i n a w l i l f d l r q (E r a d q v m l) V k * y h q r v l 4 < < < 2 5 3 3 9 , z l a o r i i h u d q h z s h u s h f v l y h r q v k h g h e d v l 1 G h p r f u d f | l v q r w d p l v n g v v k h d j l v p d f l r i / d q g w x w l q / s r z h u l l w d o v l q y r g y h s u l q f l s d v r i n a w l i l f d l r q i r u l w v x e r h f w l q v k h l r x f d x g l d q g r x e d h v h q v h r i e h l q j e r v k l w v x e r u g l q d v l v d q g l w v r x u f h v l i u d g l q v k l v d j k v l U l h v p d q d V k h O r q h d F u r z g / r i v n g v h h q d v v k h h s l w p h r i v k h p d w v r f l h v l v k h l v / v v r q j d v x j j h w v k d w k h p d w v r f l h v l f k d u l f v l u w x f v x u h l v q r w d d h q d v n g d q g d s d v k h u l f 1 V v v k h f r q w d l / p d q l r i v k h s k h q r p h q d v k d w l n g g v e h l q v l u s u h v n g d v v k h g h f d q h r i u s u h v h q v m l y h g h p r f u d f | N g l v w x w r i v k h w a l v / p r u d d } d l r q r i s r d w l f v / q h z p r g h v r i j r y h u d q f h / d q g h f w a d s l u d d p h q v l l r u p v r i u h l w a d f h N h f s u h v l q i d f w k h x y h q w v h q v h r i d j h a f l / h y h q d a l h v l d e r x w l w i h a v e l f r q v l p s r u d l h d f v r u d l v l

Vkh P dw V r f l h v l V k h l v

Vkh u r r w r i D p h u l f d q p d w v r f l h v l v k h r u h v z d v q r w f r q f h u g h g d e r x w u s u h v h q v m l y h g h p r f u d f | g l u h w l / e x w d e r x w k h i d l v r i v k h l a g l y l g x d o l q u d s l g d g h O u d g l v r q d d } l a j p r g h u q v r f l h v l / h f k r l a j d k r x v k r a g v k h p h l q f a d w l f d o v r f l r a j j | v x f k d v G x u n k h l p d y l h z v r q d a r p l h / r u l v p p h o

z ulvaj r q p hwr s r d v / p r q h / d q g p r g h u q v r f l d e l d v / 1 D f f r u g l q j w
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g h s h q g h q f l h v r q d x v k r u l h v d a g i d p l d h v / e x w z h d o r q h n g r v k h u s h r s d h
w u h d r q 1 V k h r g r u D g r u q r +4<9725337, f u l v f l } h g H { l w n q l d d v w
g h f a d u d v r q v r i v k h r u j l q d o d x v k h q v l f l v r i p d q + g h w w | h g e l
p r g h u q l v j , d v p h u d j h p s v j r a j r q / v l q f h v k h | g l g q r w h f r j q l } h v k d w k h
l q g l y l g x d o l w h o z d v d s u r g x f w r i p r g h u q v r f l h v / 1 L q k l v Ö p p d q h q w
f u l v t x h Ö k h w a n h v g v k d w k h s d w l r q i r u d x v k h q v l f l v j d q g g l i i h u h q f h l q
v k h h q g e h f r p h v l q g l i i h u h q f h d a g v d p h q h w l q p d v v r f l h v / 1

V k h s r w Ö d u | h d v p d g h l w s a d l q v k d w d o D p h u f d q w d g l v r q v
h { l w l a j / l q f a x g l a j u x d o S x u l v a j l v p / x u e d q z r u n l a j f a d w f r a n f v l y l v p /
d a g r a g p l g g d f a d w l g h q v l v j / z h u h e h l a j f k d a h a j h g 1 Q h z l q g l y l g x d a j
e d v n g v l h v w u h s a f h v k h p d s s h d u n g k a d g w i l a g 1 D g k h u h q f h z l v k r v k h u v
s u h x s s r v h v v k d w s h r s d h h { s h u h q f h g l v l q f v a h v d a g g l i i h u h q f h / e x w d w
v k h v d p h v l p h d u h q r w l a g l i i h u h q w w z d u g v h d f k r v k h u / h y h q z k h q l q v l u h w w
l q r v k h u v v h u y h v q r x v d v a l d a q s x u s v h 1 G h w w x f v l r q r i v k l v f d s d f l v j
l a g x f h v v k h v d p h q h w r i h y h j v k l a j / r u w x v h d a h { s u h w l r q r i J l a n v
G h d x } h +4<9; , / l a g l i i h u h q f h r i g l i i h u h q f h v > l w g d p d j h v v k h v r f l d o e r q g
l w h o 1 V k h p d v v r f l h v j v k h r u w w f d p h w g l v p d o f r q f a v l r q v = v k h i x o
d x w r q r p | r i p r g h u q l q g l y l g x d o v d o d g v w v k h l u r z q g h w w x f v l r q 1
D g r u q r Ö +D g r u q r / l u h q n h a E u x q v z l f n / C h y l q v r q /) V d a j r u g / 4<83,
d x v k r u l v a l d a q s h u r q d d v j / H u l f k l u r p p Ö +4<7424<<4e, d x w p d w r q /
F k d u h v Z u j k w P l a v Ö +4<8<, f k h h u x o u e r w d a g r v k h u v l p l a d u
Ö k a d f l v u w w x f v x u h v Ö f d a j w d f r q i r u p l v j v k d w d o z v d w a h u r p i r u
d x w r q r p | d a g v h o Q g h v n u p l q d v r q 1 V x f k v r f l h v h v d u h u d g l d j r y h u a h g
e l s r z h u v v k d w p l j k w q r w e h v n h q v k h p v h y h v e x w v k d w r s h u d v v k u r x j k
f k d u l v p d m f d o d g h u / v x x u s l a j z h a n q r z q a z v r i p d w s v l f k r a j |
+E r u f k / 5339, 1

H x u s h a q d a g U x w l d a q w v a d v a l d a j l v p v l q v k h u h f h q w s d w z h u h v k h
s u p d j v f d u h 7 1 V k h f h q w a b o t x h w l r q z d v k r z w h { s a d l q v k h u v h r i
Q d j l v p / l d v l v p / d a g V a d d a j l v p / d a g k r z w d y r l g v k h p u h f x u l a j l q

Dp huf d/ d uln eur xj kwyhul f ar v h w revhuyhuŌh| hv lq P f Fdukl| lvp 1
 Vkh sdudglj p z r u n r q v k l v x e r t f w z d v K d q q d k D u h q g v Ō V k h R u j l q v r i
 V v a d v a l u d q l v p / z k h u h v k h d g y d q f h g v k h y l h z v k d w v x s s r u h u w r i
 w v a d v a l u d q p r y h p h q w z h u h h l v k h u l v r a d m g / d s d v k h m f l q g l y l g x d a v r i v k h
 a z h u p l g g d h f a d w / r u p h p e h u r i v k h p r e / v k h O x p s h q s u r d h v a l d v i V k h
 d f t x l h v f h q w i d p l q p d q i r a z h g v k h f u r z g w n h h s k l v k h d g g r z q i r u
 v k h v a n h r i v k r v h q h d u k l p / x q d e d h w g h i h q g k l v l q v u h w w l q f a d w a e d v h g
 s r d w f d o r u j d q l } d m r q v 1 V v a d v a l u d q p r y h p h q w d a g u h j l p h v j u r z l q v k h
 v h g e h g r i s r d w f d a j f a d w d w v r f l h m h v + D u h q g w 4 < 8 4 2 4 < 6 / s 1 6 3 8 0
 6 7 3 , 1 2 l a d p N r u q k d x v h u + 4 < 9 3 / s 1 6 6 , v x p p d l } h g v k h v h y l h z v q r v l a j
 v k d w Ō p d w v r f l h v l v d f r q g l v r q l q z k l f k h d v h g r p l q d m r q u s a d f h v
 g h p r f u d f u x d n 1 P d w v r f l h v l v r e r t f v y h d v k h d m p l } h g v r f l h v / d a g
 v x e r t f v y h d v k h d d h q d m g s r x a d m r q Ō

P d w v r f l h v v k h r u h v / d v g h v f u e h g d e r y h / i d a o v k r u w r i h { s a d l q l a j
 z k l / l q i d f w g h p r f u d f l h v k a y h q r w x u q h g l q w v v a d v a l u d q l v p v 1 V k l v
 i d o x u h u x x a v i u r p v z r d p l v a m r q v 1 l l u w d n h v k h r u h v r i u s u h v q h v m l y h
 g h p r f u d f l q j h q h u d o v k h l r q d h { d p l a h g h p r f u d f l q v n u p v r i
 f r q w r a d a j s r z h u v k u r x j k d j l v p d m a j s u r f h g x u h v d a g v a x w v s u h g l f v l a j
 v k d w l a g l y l g x d d } h g v r f l h m h v a d f n v k h f d s d f l v i r u e r v k 1 V v a d v a l u d q u x d
 l v d w x p h g w i r a z d v v k h r q d d a h u q d m y h 1 V h f r q g / v k h l p s a v l r q r i
 g l i i h u h q f h v v k d w u x x a v i u r p t x d m O x q l y h u d o d x w q r p l r i p r g h u q
 l a g l y l g x d a v N v k h v k h p h v r g h d u w p d q l p r u h u h f h q w H x u s h d q
 s r w p r g h u q l w v x f k d v E d x g u a d a g / P d i i h v r d / l h d v k h u w r q h d a g h y h q
 J l g g h q v N l v d s u r e d h p d m f d w x p s v l r q l q p x f k r i v k h p d w v r f l h v /
 v k h r u 1 V k l v l v s u h f l v h d z k h u h U l h v p d q Ō z r u n z l a e h k h a s i x a d v z h
 z l a a r n d w l v f a r v h d e h a z 1

W u h f r y h u v k h s u r e d h p z h d a v q h h g v r p h e d m f v r f l r a j l f d o v k h r u l
 r q k r z v r f l h m h v r i d x w q r p r x v l a g l y l g x d o d j h q w k r a g v r j h v k h u l q v k h
 i l u w s a d f h 1 V k l v l v z k d w L f d a o v k h v k h r u l r i n a w l i f d m r q / i r a z z l a j v k h
 l u h a f k v r f l r a j l w O x f E r a d a q n l) O a d u h q w V k • y h q r w + 4 < < < 2 5 3 3 9 , 1 l w
 v f r s h l v z l g h u v k d q p h f k a d l v p v r i f r q w r a d a j s r z h u l l w h { v h a g v v k h
 d a d d v l i u r p k r z v k h g r p l q d m g n a w l i | g r p l q d m r q / w k r z v k h l n a w l i |
 v k h p v h a y h v l q v k h l u v x e r u g l q d m s r v l v r q 1 Z h q h h g w x a g h u v a d a g
 u s u h v q h v m l y h g h p r f u d f d v e h l a j l w h a s d u w r i v k h k l w u f d o s u r f h w l q
 z k l f k p r g h u q v a x f v x u h v r i n a w l i f d m r q k a y h e h q f u h d m g 1

Mkwilf dvlr q

Dffruglaj w Eradqynl) Wk•yhrw +4<<<25339,/ daj vrfllhv p xww
 nwlil lw hflwqf h dgg klhufklf dorughu w dwdl wklh σ| daj ri lw
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 lluw/shr sdh p xweh dedh w vko z kr ehaj v w vkhluvrfllhv/ dgg vkh|
 p xwdl fhswwkdw/ dffruglaj w vrp h z hahqr z q sulqf lsdhv/ p hp ehur ri
 vkh vrfllhv duh xqht xda| uhz dughg dgg srvlvr qhg lq lvt Vkhv duh vkh
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 p xweh vrp h d| uhph hqwr q vkh frpprq jrrg1Lq prghuq lqgxwldo
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P| daj xp hqwlq vlv dulf dh lv vkwkvh lqvwuqdlr qv dgg sudf vlf hv ri
 uhsuhqvavlyh ghprfudf| duh qrwkvh hgg uhxavri exwsduwri vkh
 surfhw lq zklf k vkh prghuq sulqf lsdhv ri nwlilf dvlr q kdyh surj uhvng
 w d srlqwz khuh vkh| qrz kdyh ehfrp h vduvduhg1Vkh| duh vko vkh
 vdp h sulqf lsdhv dv ehiruh exw/ nwwdv d vravlr q ri vdomlq z dnuuhvuv
 w lw fuj wddqhirup zkhq frqf hqwdvng/ vr vr vkh prghuq gl qdp lf
 sulqf lsdhv ri nwlilf dvlr q qrz vdhrrq dghz irup 1

Uhsuhqvavlyh Ghprfudf| dgg Mkwilf dvlr q lq P rghuq Vrfllhv

Lwp xweh uhp hp ehuhg vkw ddkr xj k vkh vkhruj ri uhsuhqvavlyh
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 sudf vlf hv duh urvng lq adlv qlqhvnhqv f hqvu| srxadu pryhp hqw/
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Hxursh/ rqq lq vkh frxuh ri vkh vxuxdqwfcdw frqidfw dihuu vkh Vhfrqg Zruog Zdu/ yhu/ xqhyhqđ dāg zlvk p dā| vghvlnsv dāg h{fhsivr qv/ dv h{hp sdilhq el vkh Vsdqlvk dāg Sruxj xhvh glfvwv ukslv/ ruvkh shur qdd}hg suhvlghqvdobuhj lp hv ri Suhvlghqvwgh J dxahŲ l udf h dāg SuhvlghqvwNhnrr qhqŲ l lqadāg1

Sduđp hqvdū lqvwvvr qv z huh qrwr qđ vkh uhdd}dvr q ri lqglylgxdob dxwqr p| dāg iuhgrp lq vkh srđvlf do vskuh1 lq vkh iudp hzrun ri qdvr qŲvavlv vkh| dvr surylghg d sāvvr up iru vwxj j dvr ryhu vkhvh suqf lsdv ri nāvlif dvr q lq rvkhv vskuhv ri dih/ qrvled zrun/ frqvxp svr q/ idp lq dāg vñ{xddv/1 Lwlv hvhqvvdobvkdvkhvh suqf lsdv ri gljqlv/ dāg zruv/ dākrxj k dāp rwxqlyhvdāđ dffhsvng/ z huh yhu/ lqfrp sdvnd}uhdd}hg vkoolq vkh srwvz du z hvhuq vrfllhv +/vxoxqhq/ 533<, 1

Sduđp hqvdū srđvlf v z dv dā lp p hqvhd hiilfhqwp hfkdqlvp wv sxuxh vkhvh suqf lsdv ri nāvlif dvr q1 Lwz dv d j uhdw sduđr{ vkdv prghuq vrfllhv lq vkh hād vā hqvlhv f hqvū vhwvhg lqglylgxdv/ dāg vñ{frqvro exwvūqhg wv vāvlhf hqvūhg vrvvr qv lq surgxflqj vkh p1 Hgxf dvr qdō srđvlhv z huh h{svhd ghvj qhg wv vxssd dā dāht xdvnd vnlāhg ādvr uiruf hiruvkh j uz lqj lqgxvvdohfr qrp lhv/ dāg frqvht xhqvd iru pdlqvūqlqj kljk preldv/ ervk yhuvf dā dāg kru}rvāđ1 Xqlyhvdob dxwqr p| lqyrqhv dā dxvuhg ghj uhh ri hfrqrp lf dāg vrfldo ht xddv/1 Z hāduh ehqhilw z huh ghvj qhg wv hāplqdvā ghshqghqflhv r q idp lq vlv/ dāg sxedf vhuylfv z huh ghvhar shg wv hqdedh zrp hq wv sduv lsdv lq vkh ādvr up dnhv Vhyhudo uhp dlqlqj ghivf w ri vkh Uhf kvvādvz huh frvuf vng/ dāg dñ douhj xādv q ri vñ{xddv/ z dv dēhdd}hg wv dāvz lqglylgxdv pruh fkr lf h dāg iuhgrp r q vkh vñ{xdo p dnhv Dā vkhvh uirup v p dāvdd}hg lq d p dvlyh z dyh ri qhz dñ lvādv q/ sdvhg vkrxj k uhsuhvqhvwlyh ghp r f udf lqvwvvr qv/ lq dā Z hvhuq frxqvūhv ehvz hñq vkh ādv 4<93v dāg vkh hāg ri vkh 4<3v/ dāg vrp h ri lwfrqvlqxhv vkā wv gdl1 Sduđp hqvdū srđvlf v v z dūgv vkh iuhgrp dāg dxwqr p| ri lqglylgxdv iurp shur qdō dāg vāglvvr qdōv hv z dv lvhā sduvri vkh vrfldoer qg/ dv d p dnu lqvwxp hqww dgydāf h vkh frp p r q j r r g ri vkh qdvr q +/vxoxqhq/ 533<, 1

Ulhvp dq uhyvlvng=dj hqf | lq p dw vrf lhw

Gdylg Ulhvp dq +4<3<05335, ehf dp h dq hp edhp ri dj hqhuwr q ri srw0 z dndehudor z ruvhg der xwkh idvri vkh lqglylgxdolq p dw vrf lhw/ z lvk klv errn Vkh Qr qh/ Fur zg +Ulhvp dq/ 4<83, 1Klv z r un dsshduhg z khq vkh XVD z dv dauhdg| dssurdfklaj vkh shdn ri lw lqgxwldo ghyhar sp hqvl vkh frqvxp hu vrf lhw/ z dv dwkdqg z lvk lqglylgxdol z hoo ht xlsshg krphv/ fdwv dqg fkhds frqvxp hu jrrgw/ dqg vkh qrq0 surgxflvyh xuedq qhz plggdh fadwv z dv ulvqj 1 lqglylgxdol dxwqrpl f hqvlvuhg rq vkh sulydvl idplq z dv dauhdg| vkh qrup 1Doo vlv z dv w kdsshq lq Z hvlvud Hxur sh r qd der xwlvvnhq | hduv ru vz r ghf dghv advnu +vxonxqh/ 4<5>Vkhuer uq/ 4<<8,1

Dv vkh fadwvfdovvrf l r aj lwv kdq grqh/ Ulhvp dq vdz prghuq vrf lhw/ dv lqkhuhqv dqlvudglvwr qd/ euhdnlqj gr z q vkh r qg vrfldoVhw/ exwklv vnhh r q vlv vkhph z dv xqltxh dqg vlao lqwxflvyh1 lru klp/ dqlv0 wdglvwr qdolqglylgxdovp pdl ehri vz r vshv1Vkh iluvv0Qqhu0gluhf vng0 fkdudf vnu/ fruhvsrqgv w P d/ Z hehu0 xqghuvdqlqj ri vkh vsluwri hqvlvuhghxldo fadlvadp 1 Vkh vhrfraq/ 0vkhv0gluhf vng0 fkdudf vnu/ ghyhar sv z khq lqgxwldofadlvadp ehfrphv d vrf lhw/ ri frqvxp svlrq/ grplqdvng el vkh plggdh fadwvhw dqg p dw fxawuh1 Rvkhv0gluhf vqhw p hdqv vkdwsxuxlwri vho0qvlvuhwvdqg lqvlvudq}hg sdvlvqv ri frqgxfw duh uhsadfhg el | hduqlqj iru dssurydo el shhu1 Hmt xhvlv iru p dlqvdlqaj fadw exqgdulv ehfrphv dnv lp srudqvvdq frqirup lvy zlvklq rqh0 rz q jurxs ri uhihuhf h1 Z khq fadw0edvhg frppxqlvhw hurgh/ dv vkh| p xwvlq frqvxp hu vrf lhw/ lqglylgxdol ehfrph lvr advng +0vpl}hg0 z dv vkh hyrfdvlyh vnuv, / dqg xqdedh w ghvhqg vkhlu lqvlvuhw1 Jurzljaj dxwqrpl vxuqv khurlf lqglylgxdovp lqv lw rssrvlvw/ fudyhqqhw ri vkh pdqj⁹¹ Vklv kdvdq lp sdfw r q vkh lqglylgxdol0svl fkr ar j l f dof r qvlvuvr q f dvhg fkdudf vnu 1

Hyhq z runlqj fadw shrsdh dvlvuh w eh lqghu0gluhf vng lq vkh sxuxlw ri vkhlu0qvlvuhw dqg lq vkhluuhvshf w iru vkh 0kdugqhw ri vkh p dvlvud0 zklfk vkh| vnhh sulgh lq fudlvaj w irup jrrg rerthw iru xvhl Lq frqvdwv vkh qhz plggdh fadw z runv z lvk vkh 0vri vqhw ri kxp dqv00iru h{dp sdh dv vdhvshrsdh vllqj w dwxph vkh shushf vlyh ri vkh frqvxp hu ru z khq vkh| dfwlviruhp hq nqj j daj z lvk vkh p ddaq hp hqv0 lqvlvuhw dqg vkh lqvlvuhw ri vkh hp sar| hlv1 Lqvlvudg ri ruhqvklaj

vkhp vho/hv gluhf vq/ vrz dug vkh valn dwkdqg/ vkhl dgrvwwvkhp vho/hv vr
rvkhushrsdri 1

Zrun ruhqvdmrq lv lq vxqh zlvk d shurqō ruhqvdmrq vr
frqvxpsvrmq dgg dhlvxh1 Vkh lqghuQgluhf vng fkdudf vhu hlvkuh valnv qr
j uhdwlqvluhwvlq vkhp dwdad ru uhdvrv vr vkhp/ vrr/ dv dq duhd ri
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dftxlvlvrq ri ydoxhg rertf w/ rulp surylaj vkh krph1 Lq frqvadwrv vkhu
gluhf vng frqvxp huw | hduq iru h{ shuhqf hv1 Vkh lqvwvQp hqvadv/ ri vkh
lqghuQgluhf vng lv uhsadfg el zkdwp lj kweh fdahg h{ shuQp hqvadv/ N d
nlqg ri dggf vlrq vr h{ shuhqf h lwhō/ dq rertf vhw fudyaj 1 H{ shuhqf h
kdv qr xahvru rertf vlyh ru sxusrv> lwlv vdvldf vlrq dv vxfk dgg dv
xvhvhw lq idf wdv lwvhhp v vr eh lq dsshaduf h<1 H{ shuhqf h lwhō/ ri
vh{ xadv/ ruri irrg/ iruh{ dp sd/ ehfrp hv sxedf dgg rshqd glvsad hg
vr vkhu1

Ulhvp dqō dadd vlv iurp pruh vkdq d kdi fhqvyl djr dssdhv vr
frqvmp srudj frqvxp hu vrflhv hv uhp dunded z hō exwxqdnh rvkuh
p dv vrflhv/ vkhr uhv/ lwklj kdj kw dj hqf | vdkhu vkdq sdwlylv1 Rvkhu
gluhf vngqhw grhv qrwlp sd dsdvk/ dgg dāhqdvrq1 Lq vklv uhvshf wlv
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P dihvrd 4<<9> vhh dāv l dāv 4<<7, / zkr kdv vānhg derxw vkh
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fhqvyl Dphulfd iru Ulhvp dq/ dgg hqgōi Ōkh fhqvyl Hxursh iru
P dihvrd/ rshqv vkh shur qadv/ irulqvshf vlrq dgg dūlf xadv vkh ghvuh
vr vkduh dhlvxh dj hqgdv ri vkh shhu jurxs1 Krz hyhu/ hslghup lf
frqvflrxvqh lv qrwk vdp h dv frāsvaj r qhō lghqv/ zlvk vkrv ri
rvkuh> r q vkh frqvad/ lwlv dz duhghv ri ehqj r qhō vho/ vhsdudv dgg
gliihqwiurp rvkuh exwrshq vr vkhu dssuryd/ hyhq dgp lvdvrq1 Lq
rvkhu z rugv/ lwlv dq lp srudqvshf vri z kdwl kdyh hvhz khuf dāhg d
vhqv ri lqv df | / dv lp srudqv wru d frqvflrxvqh ri dj hqf | dv

dxwqr p | ri vkh lqglylgxdd³¹

I xukhup ruh/ dv **Shuh Erxuglhx** kdv wuhwhg +4< <24< 7, h{ shuhqf h/ kr z hyhu xqp hglvng lq vkh Ndqvldq vhaqv/ Iv qr wvwhvUuh +dokr xj k lwp lj kwdsshdv dv wvwhv lq f ulvf do uhi dhf vlr q, 1 Hyhq lq p dv vrfllhv/ shrsdh duh qrwlggliihugwv z kdwlkh/ ehdhyh r vkhuv w frqlghu dv jrrg wvwh> r q vkh frqwdv/ dssurydoel r vkhuv lv iru vkh p vkh p r wlp srudqwr xuf hri p hqlqj d qg hp r vlr q 1

Krz hyhu/ shhu jurxsv lq frqvxp hu vrfllhv gr qrwirup wvwh frp p xqlvhw z lvk j urxs erxqgdulhv1 Vdlqlqj fklaguhq w vrdudqf h d qg v w vkh p lqlp l} dvr q ri edulhuw d qg w adf n ri glwdf h ehvz hq fklag d qg dgxw Erxqgdulhv durxqg fadw d qg d qj vrfldo urdh vng w z hdu rxw exvlgwvp hq p d j z hdu lqirup do f vkhv w z run/ hyhqlqj guhwvh duh z ruq lq j udxvur q sdulhv lq z runlqj f adw dv z hddv lq xsshu f adw vkrro> dgxaw d qg fklag urdh vng w eh pl{hg xs/ d qg vrfldo frqilj xudv qv lq idp ldhv ehfrp h lqf uhdv qj d shur qd d Salhqw d qg vndf khuv qr aj huht xluh nlgv w frp sd z lvk vkh l udxvkr ulv> vkh/ p xw shuxdgh d qg d j xh/ z klk vkh/ dvr h{ shf wri fklaguhq 1 l ru plggd0 f adw dgxaw lwp d j hyhq eh gliilf xaw glwaj xlvk z run d qg sa d / dv vkh vrfldel dv lq er vk lv p xfk vkh vdp h vdnlqj d qg j r wls lqj 1 U l hvp d q d f fr xqwwur qj d vxj j h w vkdvr vkh u d l u h f vng lqglylgxddv/ sa d hv p xfk j uhdvhu wvhw r q lqglylgxddv/ vkdq lqghu d l u h f vng qhw/ z klk l v r u h qvng w vhu rxv d qg h v h qv d o j u r x s p h p e h u k l s v d q g g l i i h u h q f h v e h v z h h q v k h p / q r w e h v z h h q l q g l y l g x d v z l v k l q v k h j u r x s v 1

Vkh wvhw r q d j h q f | k d v v z r f r q v h t x h q f h v i r u U l h v p d q d d q d d v l v r i p d v v r f l l h v / s r d v f v 1 l l u w i r u k l p v k h a d f n r i l q v h p h g l d j j u r x s v g r h v q r w d x w p d v f d a j l p s d w v r q j f h q w d d } h g s r z h u / d v z d v r i v n q d w x p h g l q p d w v r f l l h v / v k h r u h v + N r u q k d x v h u / 4 < 9 3 , 1 R q v k h f r q w d v / U l h v p d q d p r g h o r i p d v v r f l l h v / l v y h v n g z l v k d a j h q x p e h u r i p r u h r u d n w d u e l w d j y h w j u r x s v N w d g h x q l r q v / v k h Q d m r q d o U l i d D w r f l d m r q / u d j l r x v j u r x s v / p d q l n l q g v r i p r u d o d g y r f d m r / d q g v r r q 1 V k h / g r q r w q h f h w d d j k d y h v r d g f r p p r q l q v h w w e x w r p h v l p h v v k h / p d j 1 S r z h u j h w g l v s h u h g / e x w u h l w d q f h e h f r p h v g h y r q y h g d q g g h f h q v h u h g 1

Vhf r q g d / v k h r v k h u d l u h f v n g f k d u f v h u l v q r w l q l w h d d x v k r u l w d d q / l q g l j q d q w x o w d f r q v h u y d v y h r u d s d v k h m f 1 L w l v d q { l r x v d e r x w e h l q j

df fhsvng ej r vkhu/ d qg vlv d q l h v/ er qgv vk h l qglylgx d v r vkhu l q
 v d h u d q w d s s u r y d o l H y h q v k h f r q v h u y d m y h s u h v d l p h g d w r v k h u d g l u h f v n g
 d x g l h q f h v d y r l g v v a n l a j d i d w d q g w u r q j v a d q g r q v r f d o l w x h v v k d v
 p l j k w k d y h v e h u y h u h g w p r u r z 1 V d h u d q f h l v q r w l q g l i i h u h q f h > r q
 v k h f r q w d u j / r v k h u d g l u h f v n g s x e d f v d u h n h h q d l q y r g y h g l q s r d v f d o
 h y h q w d a g g h e d m v / q r w d v v s h f v a r u w e x w d l q v l g h u r 1 U l h y p d q f d a v v k h p
 l q v l g h o g r s h w l u r 1 R v k h u d g l u h f v n g q h w p h d q v v k d w r q h k a v d j u d w g h d o r i
 v r f l d o v n l a v / r i z k l f k v k h p r w l p s r u d q w l v v k r a g r q h o h p r v r q d o i l u h l
 Z k h u d v l q q h u d g l u h f v n g s r d v f l d q v d a g p r u d d } h u v d l p v l q i x h q f h
 r v k h u / r v k h u d g l u h f v n g s r d v f l d q v d l p v e h d f f h s v a e d h d a g f k d a j h v k h l u
 y l h z v v v x l w k h l u s x e d f v 1 V k l v h y h u j r q h f d a g r / r u f d a d w d h d w w l = r q h
 g r h v q r w k d y h v e h d j u d w r u d u r u d v r f l d o s k l a r v r s k h u v i h h o s d u w r i
 v k h j d p h 1 V k h l p s r u d q w k l a j l v v n q r z z k a w n h l s h r s c h d u h g r l a j d a g
 v k l q n l a j l q j u d w l w x h s r d v f v N d a g e h l r a g \$ S r d v f v l v d v s h f v a f d n r i
 f r q v x p s v l r q z l v k j a p r x u q r a q j h u v k h g r x u v s k h u h r i s r z h u d a g l w
 f r q v h t x h q f h v + U l h y p d q / 4 < 83, 1

Rvkhu d g l u h f v n g f k d u d f v n u d a g q h z s r d v f v

U l h y p d q f r q f a x g h g k l v d a d d v l v z l v k d k d s s l h a g l a j / d v h f v l r q r q
 o k w r q r p | O z k h u h k h s a l l q w d u r v j x w s l d r i d a h z n l a g r i l a g l y l g x d d v p
 l q v k h p l g g d h r i p d v v r f l h v 1 F u l v v v k r x j k w k d w k l v z d v l a f r p s a l e d h
 z l v k v k h d a d d v l v v k d w z h q w e h i r u h l w d a g v k h z r u w s d u w r i v k h e r r n
 + P f F a j / 4 < < 7, 1 L w l v v k h v k d w v k h f r q q h f v l r q l v q r w z h a p d g h / e x w
 q h y h u k h d h v v k h u h d u l q v l j k w l q k l v v k l q n l a j v k d w k h a s x v r y h u f r p h v k h
 v k h r u h f d o w x p e d a j e a f n v l q p d w o r f l h v v k h r u d a g p d n h x v e h w l u
 x a g h u w d a g v k h s k h q r p h q d u a d v n g v v k h g h f d a q r i u s u h v h q w l y h
 g h p r f u d f | 1 D v v x j j h w n g d w v k h e h j l a q l a j r i v k l v d u l f d v i r x u r i v k h p
 f d a o r u v s h f l d o d w n q l r q = 41 h a f w u d o q r q o s d u l f l s d v r q l w h o d a g u a d v n g
 u j k v o l a j s r s x d v p > 51 p h g l d v i d v r q d a g p r u d d } d v r q r i s r d v f d o
 d j h a g d v > 61 q h z p r g h v r i j r y h u d a f h > d a g 71 f k d a j l a j i r u p v r i
 u h l w a d f h 1

Q r q o s d u l f l s d v r q d a g u j k v o l a j s r s x d v p

V k h s h u l w n q w r u h f x u h q w h d f w u d o v x f f h w r i h f w h p h u j k w r u x a u d o
 f r q v h u y d m y h s d u l h v l q H x u s h a d a g Q r u k D p h u f d a s r d v f v k a v r i v n g

ehhq đwđexvīg vř vkh đv h ri vkh qhz plggđh fđwv +Fudz ir ug/ 4< 3,1
Hylghqf h đdv qřw xssr uīg vkhv vkh r đv h v1 Yđo Exulv +4< 9, z đv
řeylřxvđ đj kwz khq kh fr qf ořghg vkwđqr vkh r đj vkwđvđf đehv hlvkh đ
dehudo ghp řfudvīf řud fr qv h yđv h/ hyhq đđf vīr qđđl sř đvīf đo đw v xgh
vř vkh z kr đh řu ořz hu qhz plggđh fđwv/ krz hyhu ghilqhg/ fđq eh
hp sluf đđđ ř řu h f vī Vkh sř đvīf đo f đđ yđj h lq fr qv h p sř đđđ f đslv đđw
vř fl h v h f xw v kř xj k vkh plggđh ři vkh z kl v h f ř ođu đđ qv n1 Z khuh đqg
krz vkh đqđ vkr xqđ eh gđz q lv đ fr p sđđ p đw h v đ ođ kř xj k Exulv
klp v h ođ ehđ hyh v vkwđvlv vkh ořz hu plggđh fđwv vkwđwhg v xs ř q lw
dehudo v lgh vđ vkh v kđqđ ylf h y h v đ⁴⁴1

Đor U l h v p đq z đv z đđ ři vř vđ vđ đđ p ř y h p h q w đ n h p ř w đ e h u d o v
lq sř wđ đ u Đ p h u l f đ +P f F đ / 4 < 7, / exwqr wehf đxv vkh r vkh đđđ h f vīg
plggđh fđwv z ř xqđ eh glv sř v h g vř m l q v k h p 1 Sř đvīf đo đsđđđ / ř u đ j k v đ
z l q j s ř s x đ v p / l v q ř w i r u U l h v p đ q / x q đ n h i r u F 1 Z đ j k w P l o v / H u l f k
l u r p p / ř u Z l o đ p N ř u k đ x v h u đ g l u h f w f r q v h t x h q f h ři vkh q h z 0
plggđh fđwv đqg lw l q f đ q đ m r q vř f r q i r u p l v ř 1 L q v h d g / l w p đ j j h q h u d v h
l q g l i i h u h q f h đ q g đ j h u l q ř v k h u j u r x s v 1 L w p đ j u h v x o v i u r p v l g h o v d f n h g
v d g l v r q đ đ v p ři p ř u d đ h u l q g h f đ q h / l h 1 l q q h u d g l u h f vīg s h r s đ z k r
v h v k h l u y d o x h v l q š u l o e l v ř f l d o f k đ j h đ q g s o x u d v p 1 V x f k š u v r q v
i h h o l q g l j q đ q v⁵1

Vkh vđp h đssđhv vř vkr v h z k r đ h l q g l i i h u h q w e h f đ x v h v k h l đ h
ghsđy h g ři vkh v ř f l d e l d v ř ři vkh l q v l g h o g r š h v h u v 1 l q g l i i h u h q f h p đ đ đ o r
đ v h i u p v l v d m r q v v k d w p đ j e h v r g h s h v l q j vř v d l v đ q l k ř š i r u
l p s u r y h p h q v l V x f k š h r s đ h f š u l h q f h v k h l u o d f n ři i r u x q h đv x q r v v
e h f đ x v h v k h l g r q ř w x q g h u v d q g l v v k h š u q f l s d v n v m l l q j
g l i i h u h q v k d m r q đ h q ř o ř j h u z l v k l q v k h l u f r p š u k h q v r q 1 V k h l i h h o
e l v h u v ř z d u g v v k h f l v ř v d f n h u v e h f đ x v h v k h l h q y l v k h l u v x f f h w đ q g
v x u h q h v ři j u d v / z k l f k v k h l ř y h u d v h đ q g p l v l q v h u s h w d v v q r r v l q h v
đ q g v o d š k d s s l q h v ř z d u g v v k h l u y d o x h v 1 H v š f l d o đ v x v š f w v v k h p đ h
l q v h o d f v d o d e h u d o / z k r v h v ř d u d o f h l v e r v k đ g l u h f v k h u d w v v k h l u
y d o x h v đ q g đ q l q g l u h f w e o f n d g h vř v k h l u h i i r u v vř v h w v k l o j v e d f n đ q g
đ j k w + U l h v p đ q / 4 < 83, 1

Rq vkh r vkh u k đ q g / l i v k h r v k h u d g l u h f vīg f k d u f v h u l w h o l v p l w x v i x o
ři vkh w d m r v k h u l v đ u d v r q i r u l v V k l v p l w x v v ř z k l f k h o l q v d q v o d m r
l q v h o d f v d o d e v h q v h l v p / l v ř i v h q l q v h u s h vīg đv fr qv h y d m p / đ o r

4; Vxoxqhq OD vkuchwv uhsuhvqvwlyh ghp r f udf |

e| p lggdhf adw shrsdh vkhp vho/hv +Vxoxqhq/ 4<<5,1 Exwz kdwr rxg frqvhuymvp eh irushrsdh zkr fhdeudm vkluhf shuhqf h iruvkh vdh ri hf shuhqf h dgg glvsad | lwirur vkhuw w vnh/ dgg iruz krp qr dihwlyd f dq fadp vkh wvkvri frqvqxhg qrup ddy/BLi qr sdwvobdxvkr ulv f dq ghilqh vkh jrrg dihiruhyhul ergl/ z kdwlv vkhuw w frqvhuymvp Lv vkh frqvhuymvp ri pdw vrfhw/ rqq d ghvuh w uhwvuh dq lp djlqdu wdgvlrq vkdwkdv qhyuh hf lwng/ dq dwvqgh vkdwDssdgxul +4<< , kdvd dgg qrvdjd zlvkrxwp hprq/ d oqj lqj iruvrp hvklqj qregrl hyhu o vB

Z h p xwvvh lwdj dlqwwvk prghuq wvno urdh lq dgydqlqj vkh frpprq jrrg lq vkh uhfhqw sdwv Vvno gulyhq Surjthw w z dgg dxwqrp | ri vkh lqglylxdv qrz dsshdv dv wvno sduqddvp w vkh lqglylxdv zkr hp hj hg iurp lw Dv ghv f ulehg deryh/ vkh hgxf dlyh z h oduh wvno z dv qrup dlyh dgg wvhwng xqlirup lv/ z khudv r vkhuo gluhf vng lqglylxdv wvhwv dxwqrp | dgg gliihuhqf h1 Rvkh ugluhf vng shurqv z dqw w eh dffhsvng e| rvkhuv exwvhwv eh lqj gluhf vng e| dxvkr ulv ri vkh wvno/ z klfk vkhl hf shuhqf h dv vkuchwv vklu d j hqf | dgg lqvxlqj w vklu gljqlv dgg zruk dv iuh dgg dxwqrp rxv lqglylxdv

P rudd} dvr q ri sr d w f dodj hqgdv

Ghsvlvn lw vr d u d q f h/ hyhq vkh r vkhuo gluhf vng f kdudf vnu kdvlw sur edhp v zlvk gliihuhqf h1 Dv Lkdyh d j xhg h o h z khuh +Vxoxqhq/ 5344,/ w uhshf w lqvlp df | N vkh vho ri vkh vho dv d xqlt xh dgg vhsduv lqglylxdv N p h d q v w uhshf w gliihuhqf h/ exwvk gliihuhqf h ri r qh shur q vngv w f xw lq w vkh dxwqrp | ri rvkhuv1 Vklv frqvwdglv q vnhv vkuh sulqf lsdv irup vll lwv r q h o f krlf hv Nvp rnlqj/ gulqnlqj ruguxj xvhiruhf d p sdh Nri vng lqj d f w r w r q rvkhuv iruvkh khodk/ hqylur qp hq w dgg sr d f lqj ri vkh vrfldorughul Vhf r q q d/ lwf dxvhv vklug sdw/ ylf vlp l} dvr q vxfk dv sdwlyh vprnlqj/ ylr d h q f h/ dfflghq w dgg fklag qhj d f w Vklug d/ gliihuhqf h p d j ylr adv vkh lqvij ulv ri vkh r vkhu dgg f dq eh frqvlguhg d vkuchwv lqvwxvrv qv/ vxfk dv krprvhf xdo idp l d h v t x h w v r q l q j vkh v d q f w l v r i khvurvhf xdo p d u d j h/ vkh P x v d p v f d i y l r a d m a j vkh sulqf lsdv ri adf l v p/ ruirufhg p d u d j h y l r a d m a j vkh q r u p r i l q g l y l x d v i u h g r p r i f k r l f h 1

Vkvhv duh vkh nlqgv ri frqidfwz h revhuyh gdlq lq sr dmf v d qg lq vkhu vnhp w eh qr j hqhudo v r ovr qv i ru vkhp N vkhl dsshdv dv p r udo frqidfw ehvz h hq ylf vlp v d qg shushwudmruw1P r udoixu lq sr dmf v d qg lq vkh p hgl dv lv durxvhg el ylr ovmr qv ri vkh uj kw ri vkh lqqr f hqv Xqlyhuaddv lv uhsaaf hg el dq hp skdmv r q gliihuhqf h/ d qg gliihuhqf h f d q r qd eh uhshf vng lq fr qwdf v d o f r qv h qv l Vkh v h qv h ri n w m f h z l o e h w d q v i r u p h g i u r p f r q v l g h u d m r q v r i h t x l v l w f r q v l g h u d m r q v r i vkh qhj d m y h i u h g r p r i v k h r v k h u l Z h d u h q r o q j h u d v n h g w u h v s h f w v k h s r v l w y h u j k w r i r v k h u r w e h d n h x v > z h d u h d v n h g w u h v s h f w k h l u q h j d m y h u j k w q r w w e h f r q w d l q h g e l r x u d f w r q v l Z h d u h d w d e h u l w g r z k d m y h u z h d n h z l v k r x u h o y h v d q g r x u d y h v / d v o q j d v z h d u h q r w v d l q j v k h d e h u l r i r v k h u r w g r d n h z l v h 1 H y h q l i s d u d o p h q v d l g h p r f u d f v l w n p v f d q q r w u d q v a d m j u r x s z l o v l q w d j h q h u d o z l o d e r x w v k h j r r g d i h / d w d h d w l w v h u y h v d v d s o m r u p i r u q h j r v d m r q v e h v z h h q l q v u h w w d q g l w x h v r i n w m f h / d v u h s u h v h q v m y h g h p r f u d f | v k r x o g 1 P r u d d } d m r q r i s r d m f v g r h v q r w u h x o w l p s d i u r p p h g l d e d q d d } d m r q / e x w f r u h v s r q g v w v k h i x o p d x u l v l r i v k h s u l q f l s d h r i l q g l y l g x d o d x w q r p | d v v k h p h d v x u h r i g l j q l v l d q g z r u k r i l q g l y l g x d o v d i u h d q g d x w q r p r x v d j h q w l

Qhz irup vri jryhuqdqf h

Uhsuhv h q v m y h g h p r f u d f | l v v x s s r v h g w h { s u h w v k h j h q h u d o z l o l q o z 1 L w l p s d h p h q v m r q v k r x o g e h d w x u h g e l d o | d o d q g e x u h d f u d m f s x e d f d g p l q l w u d m r q 1 V k h l w x h d e r x w u h s u h v h q v m y h g h p r f u d f | k d v t x h w l r q h g l w f d s d f l v l w v h u y h v k h j h q h u d o z l o l q v k l v z d l 1 H v s h f l d o d p d w v r f l h v l v k h r u l w w v x f k d v F 1 Z 1 P l o v k d y h s u h g l f v n g v k d w d q l q y l v e d h s r z h u h d v n z l o u h s a a f h w d q v s d u h q w w w x f v u h v r i s r z h u + O x n h v / + 4 < 7 2 5 3 3 8 , 1 L a g h n g / s u r i r x q g f k d a j h v l q v k h p r g h v r i j r y h u q d a f h k d y h r f f x u h g v l a f h v k h o d w v k l u g r i v k h v z h q v l w k f h q v x l / z k h q u h s u h v h q v m y h g h p r f u d f s r d m f v z h u h v k h s o m r u p r i v k h p r g h u q s u l q f l s d h v r i n w m l f d m r q 1 Q h z i r u p v r i j r y h u q d a f h j u d q w q h z s r z h u w w d s s r l q w n g r i i l f l d o v d a g p l q l w u h v 1 F r q v h q v r i v k h s x e d f l v r x j k w q r w e l h d f w u d o p h d q v e x w k u r x j k g l u h f w f r q v x o d m r q v / f r q w d f w d q g r v k h u p h d q v / z k h u d v o z v n g g v w v k l q r x w l q w s u r j u d p v v k d w s u r p r v n d e w d f w j r r g v v x f k d v z h o d u h / k h d o k d a g v h f x u l v / r q z k l f k d o o f d q d j u h 1

Vkh grfwlqh ri Qhz Sxedf Pdaqj hp hqw dgyrfdmg el vkh Ruj dql}dmr q iru Hfrqrplf FrOrshudmr q dgg Ghyhosp hqw +RHFG, vqf h vkh 4<; 3v/ hp skdM}hv ghyr ghyg uhv srqveldw/ orf do lqlvdmwyh/ lqf uhdvng flylf uhv srqveldw/ frp shvwr q/ exgj hmlaj el uhv xow/ dgg vkh xvh ri sulydmv hfr wru vhuylf h surylghw +RHFG/ 4<<8> RHFG/ 5335,1 Sxedf pdaqj hp hqw lv vnhq dv riihulaj d idh{ledh dgg hiihf vlyh ddmuqdmwyh w r qg d vkr qhg exudxf udf | +Fadunh hwdol/ 5333> gx J d/ 5333,1 Lwlv h{shf vng w qhxwdd}h dgg uhv ghy frqidfw lq grp dqv z khuh vkhuh duh udlf do gliihuhqf hv ri rslqlrq/ dpraj h{shuw dgg dpraj flw}hqv +Qhz p dq/ 5333,1 P dql sxedf vhuylf hv vxfk dv wdgvsr udmr q/ hqhuj | frpp xqlf dmr q dgg khdaik fduh/ kadyh ehq sulydmv}hg1 Exwdovr lq suhyhqmwyh vrfldo dgg khdaik srdf | dgg p dql duhdv ri vrfldo frqwr d sxedf pdaqj hp hqw wuhwvh sdwqhukls/ frpp xqlv/ ghyhosp hqwdgg fr rshudmr q1 VKlv uht xluhv d qhz irup ri dgp lqlvudmr q=sdulf lsdmr q dgg sdwqhukls1

Vklv irup ri ruj dql}dmr q uhsaif hv wdgvlmr qdofrpp dgg wuxf vxuhv z lvk frquwdf w ehvz hng sdwqhuv dgg vkh ixagglaj dj hqf | 1Vv vxshuylv vkh frquwdf w vkh dj hqf | qhghv hydodmr q/ dgg w vhwvkh vlij hw dgg d wdgqdlug ri hydodmr q iru vkh surrhf w/ d srdf | surj udp/ lv qhf hwdul 1 Frquwdf wlv vkh irxagdmr q ri vkh lqvlvwxvr q ri vkh p dunhvt VKhuir h lw kdv ehq frppraq h{saif qhg el vkh lghr aj | ri qhr Odehuddvp vkdw wuhwvh vkh vxshp df | ri vkh p dunhwr yhusxedf exudxf udf | dgg dov ryhu hdnf w udo srz hul VKlv khj hp rqlf lqvhusuvmr q/ dv z h p lj kwf dawl +Odf aex) P rxiih/ 4<; 8, / vnggv w eh fluf xad/ krz hyhu=lp lvdmlaj vkh p dunhwz lvkq sxedf dgp lqlvudmr q lv d frqvnt xhqf h ri dq lghr aj | vkdwidyr w vkh p dunhvt L kadyh vkr z q hahz khuh +Vxoxqhq/ 5343, vkdw vkh frquwdf wlq sxedf dgp lqlvudmr q lv adlj hq d lœxvlrq/ d irup z lvr xwdf vxdof r qvhuqv1 Vkh uhdot xhwlr q vkr xag eh/ z k| duh vkhvh qhz irup v ri jryhuqdaf h uhsaif lqj vkh klhuf klf do wuxf vxuhv vkdw duh qhf hwdul iru hdnf w udo ghp r f udf | vkrxv j lylaj z d| w vkh lœxvlrq ri frquwdf vxdosr z huB

Vnhq iurp vkh Ulhvp dql dq shwshf vlyh/ vkh qhz irup vri jryhuq hqw kadyh p r udoglp hqvlrqv idueh | r qg vkh p hulw ri vkh p dunhwdv frp sdhg w vkh exudxf udf wdmr1 Vkh frquwdf vxdoirup vr ghyv vz r sur edhp viru vkh r vkhuoglhv vng fkdudf vhu dq lrxv ri lw rz q dj hqf | 1 lluw lw uhlqiruf hv v|perdf daj vkh z hdn dqn ehvz hng lqvhuwœdvhg

frqvlwxhqf l hv dag vkh dñj lvæmlyh surfhw el riihulqj gluhfwf kdqghor i
 uhsuhvqvlm r q iru Ôvæhnr qghu r Ô Dewallqlaj iurp vkh xvñ ri vkhvñ
 fkdqghor lv dør dfkr l f h/ dv l p erdf df wri dñj hqf l uvmkhu vkdq dsdm l / dv
 dndw iurp vkh srz huðr qghu Ôsr l qwri y l h z 1 Vñfr qgd / frqvlwxhqf l hv
 qhñg qr weh elqglaj dag wædñ +dv l q uhsuhvqvlmlyh ghp rf udf l / z khuh
 hñf vñr qv f d q r qd r f f xuz l v k p x f k ñ q j h u l q vñu y d a v v k d q v k h l w x h v w e h
 dñj lvæmlyh r q , > vkh l fkdaj h iurp r q h l w x h w vkh qñ { w d q g v k h u i r u h
 d a r z i r u g l i i h u h q f h d a g f r q v l q x r x v s d u l f l s d m r q 1 L q e r v k z d l v v k h
 frqwd f v x d o i r u p / l q f o x g l a j v k h g h d e h u d m y h dñj lvæmlyh surfhw / vñu y h v
 vkh s u q f l s d h v r i n e w l i f d m r q l q p r g h u q v r f l h m h v v k d w d h g h d h w i r u v k h
 r v k h u g l u h f v l g f k d u l f vñu = w e h u h s h f v l g l q l w d x v r q p l / d a g w e h i u h
 d a g z r u k l l q l w g l i i h u h q f h 1

Vkh v z r i x q f vñr q v r i v k h f r q w d f v x d o i r u p / w u h w l a j d x v r q r p l d a g
 u h s h f v l a j g l i i h u h q f h / d n d g w d e w d f vñr q u m k h u v k d q d s d m l l q s r d m f v l
 V r g l a j f r q w d g l f vñr q v e h v z h h q / r q r q h k d a g / l a g l y l g x d a r Ô u j k w w e h
 g l i i h u h q w d a g / r q v k h r v k h u k d a g / r v k h u l a g l y l g x d a r Ô u j k w q r w w e h
 u h w l f v l g l q v k h l u d x v r q r p l / v x u q v s r d m f v l q w d g l v f r x u h r i
 d e w d f vñr q 1 V k h s x e d f j r r g j h w w e h g h l q h g d v j h q h u d o f r q v h q v x d o
 e h q h l w i r u d a r v x f k d v z h a d e h l a j / k h d o k d a g vñf x u l v / u m k h u v k d q d v
 w v d o v u l d q y l vñr q v r i v k h l g h d o z r u g 1

Ghp rf u d m f u h l w æ l q f h

l u r p v k h s r l q w r i y l h z r i g h p r f u d m f s d u l f l s d m r q / k r z h y h u / v k h g h y l o l v
 l q v k h d e w d f v l S l h u h U r v d a y d a r q k d v d j x h g v k d w v k h d j h o r a g q h f h w l v /
 r i v x s h u y l v l a j s r z h u w p d n h v x u h l w n h s v l w f r p p l v p h q w w h d f v w w
 q r z h p s k d m } h v v k h Ô g h p r f u d m f Ô i r u p d w v k h h { s h q v h r i v k h Ô d e h u d o
 w d g l vñr q 1 U r v d a y d a r q f r q f o x g h v v k d w v k h g h f d q h r i u h s u h v q v l m y h
 g h p r f u d f l v q r w d s u r e d h p > l w l v p r u h v k d q z h a f r p s h q v d m g i r u e l
 f r x q v l u g h p r f u d f l v k d w r s h u d m v g l u h f v d d a g f r q v l q x r x v d v k u r x j k
 h { s r v x u h r u v x u y h l a d f h / f r q w r o d a g n a j p h q v l l r u p v r i Ô q r q o s r d m f d o
 g h p r f u d f l Ô i a x u l v k l q v k h w u h h w / Q J R d f vñr q / g l i i h u h q w i r u p v r i
 g h d e h u d m y h g h p r f u d f l / ñ f d o d f vñr q j u r x s v / p h g l d h { s r v x u h r i s r d m f d o
 e x w d a r s h u r q d o p l v e h k d y l r u r i h d vñ p h p e h u d a g p d a j r v k h u i r u p v
 r i v x v s l f r q / p l w u x w d a g s u r vñw l V k w w l v q r ñ q j h u e d v h g r q s u r f h g x u d o
 dñj l v p d f l d a r q h / l w l v u h s a l f h g e l u h s x v æ m r q / d a g v k h u i r u h
 p h g l d m } d m r q r i s h u r q d o i d l d a j v l v q r w d v l j q r i s r d m f d o z h d n q h w e x w

dirup ri vkh ghp rfudf surfhw1

Mtuglif dmr q ri sr dmf vlv d arj lf do uhxavi up frxqvu ghp rfudf | 1
Fruxvghf lvr qv duh ilqdo d qg fr qf uhm/ z khudv sr dmf do ghf lvr qv duh
daz d| v dp elj xrxv d qg rshq w uhirup xadmr q1 Vkhuhir uh frxwv dvhv
frp elqh vkh sdulf xadu d qg vkh j hqhudo lq d fr qf uhm/ z d| / z khudv
sr dmf do nqj p hqw vxuq fr qf uhm/ suredp v ri hyhul gdl di h lqwr
dewudf vlr qv +Ur vdaqy d q/ 533; , 1 Vkhuhir uh uhsuhqvmlyh sr dmf v d qg
frxqvu s rz hu duh/ lq d sdugr { lf doz d| / dohuq dmy hv1 Qvkh fr qvr adqj
flw/ hq j dl qv z khuh vkh h dnf w udo f l w/ hq ar v hv1 Vkh qhj dmyh vr y h u l j qv/
ri vkh flw/ hq w nqj h xqghup l qhv vkh sr vlyh vr y h u l j qv/
ri vkh h dnf vng/ d qg r u j d q l } hg glw x w x q g h u p l q h vkh d w x p s w r q v k d v
w x w v l v i r x q g h g r q h d f v l r q v Q +Ur vdaqy d q/ 533; / s1 534, 1 Vkh
rshudmr qv ri frxqvu s rz hu glw d q f h l w i u p vkh h dnf w u d o l q w l w x v l r q v >
l w h i l f l h q f | l q g l f d m r v k h z h d n q h w h v r i g h f l v r q Q p d n h u 1

Kdo d f h q x u l h d u d h u G d y l g U l h v p d q f d p h w v l p l a d u f r q f o x v l r q v l
Vkh r v k h u g l u h f v n g f k d u f v u p d l q r w h q v x v l d m f d a d s d u l f l s d m l l q
l q v u h w a e d v n g s r d m f d o s d u l h v e x w v l v g r h v q r w d x v r p d m f d a d l p s d
w u r q j f h q u d d } h g s r z h u / d v z d v r i v n q d w x p h g l q p d v v r f l h v l v k h r u h v
+Nr u q k d x v h u 4-93, 1 R q v k h f r q w d l / U l h v p d q Q p r g h o r i p d w v r f l h v l /
l v y h v n g z l v k d a d j h x p e h u r i p r u h r u d h w d u e l w d l y h w j u r x s v N
w d g h x q l r q v / v k h Q d m r q d o U l i d h D w r f l d m r q / u d j l r x v j u r x s v / p d q l
n l q g v r i p r u d d } h u / d q g v r r q 1 V k h l g r q r w q h f h w d u d k d y h v r d g
f r p p r q l q v u h w w e x w v r p h u l p h v v k h l p d l 1 S r z h u j h w d e w u d f w d q g
y d j x h / e x w f r x q v u s r z h u e h f r p h v f r q f u h m 1 U l h v p d q Q p d w v r f l h v l /
d n h U r v d a q y d q Q f r x q v u g h p r f u d f | / l v g h y r q y h g d q g g h f h q v u h g 461

Q h l v k h u U l h v p d q Q p r g h o r i p d w v r f l h v l / q r u U r v d a q y d q Q f r x q v u g h p r f u d f | / v n h v k h g h f d q h r i u h s u h q v m l y h s d u d p h q v d l
l q w l w x v l r q v d v d q l q g l f d m r q r i s r d m f d o d s d m l / u d g l w e h v a n h q r y h u e l
l q y l v e d h w v a d v a l d q h d v h v 1 L q v k l v u h s h f w k h l u d q d d v h v d u h f r q y l q f l q j
d q g / l q d z d l / v x s s r u w h d f k r v k h u l V k h l v k d u h d q r v k h u l p s r u d q w y l h z =
v k h q h j d m y l v l r i s r d m f d o s d u l f l s d m r q l q g h p r f u d f d f v l r q / d q g v n h v k l v
d v d q l q g l f d m r q r i v k h l p s r u d q f h r i d j h q f | l q f r q v n p s r u d l
l q g l y l g x d d w m f v r f l h v l 1

Frqfovlrq

Er vk Urvdqydaar q dag Ulhvp dq jlyh d frqylqflaj dqvz hu w vkh txhvlrq lq vkh vlvh ri vlv dulf d= lv vrvdvdudq p dv vrfllhv/ d qhf hwdl dlvuqdvlyh dag d vkuhdwv uhsuhvqvlyh ghp rfufl B Vkh dqvz hu lv qhj dlyh1 Orz yr vlu vxuqrxw/ ulv ri ul kvz lqj sr sxdvp / prudd} dlvrq dag p hgl dlv dlvrq ri sr dlvf v/ qhz ir up v ri jryhuqdf h dag uhlv dlf h vhp vr eh vj p svrp v ri vkh glvp dosuhglf vlrqv ri p dv vrfllhv/ vkh rj exwvkh/ gr qr wuhd d vj qdo vkh hqg ri uhsuhvqvlyh ghp rfufl dag d vkuhdwri vrvdvdudq uxd1 Ulhvp dq jr hv hyhq ixuikhuv h{ salf q z k} =vk h gr p lqddwf kdulf vlu vwxv xh ri p dvxh prghuq vrfllhv/ lv vrvdvdudq lwsulqf lsdh ri kxp dq glj qlv/ dag z rulk lv dj hqf | >er vk vlgv ri l v dxv r q p | dag gliihuhqf h/ qr wdp hqhw dag frqir up l v 1 Vkh r vkh ugl h f kdulf vlu lv qr wuhd v/ vhgxf hg el dxvkr ulv/ dlvkr xj k lwlv r ulhqvng vrz dugv r vkhuv dag vhnv vkh l udf f h s v d f h 1

Er vk Ulhvp dq d dag Urvdqydaar q d dqvz hu d h qhj dlyh lq vkh gr xedh vqvh vkuhkh/ gr qr wvh vkh hqg ri ghp rfufl frp lqj / exwvkh/ dvr vklqn vkuh ghp rfufl udf vlrqv vr srz hu d h d d v qhj dlyh/ udf vlyh uvlkuh vkuh surd vlyh1 Dvr Odf dx d dag Prxiid f d d i ru dj r qlv frqir dlv dlv dlv dlv h p r qlf / qr wsur j uhlvlyh1

Vklv p d dsshdu vr eh dq xqz duddvng dvxp svlr q/ edvhg r q d v h h v h v k d q z l v k i x o v k l q n l a j 1 K r z h y h u z h f d q d a g p x w f r q v r d g d h d a g t x d d i | v k h f r q f o v l r q e l a r n l a j d w u s u h v q v l y h g h p r f u f l | d v d y h k l f d h d v z h a d v v k h r x v r p h r i v k h p r g h u q s u r f h w 1 L i z h s a l f h v k h d s s d h q w v j p s v r p v r i g h f d l l a j u s u h v q v l y h g h p r f u f l | l q v k h s h u s h f v l y h r i n a w l f d l v r q l q p r g h u q v r f l l h v / z h f d q v h v k h l u v r f l r a j l f d o v l j q l i l f d a f h p r u h s u f l v h d a g i x a d 1 G l w a x w w z d u g v v k h v a l v l v q r w n a w d q h j d l y h d w a x g h > l w l v d k l w r u f d o u d f v l r q w v k h q r u p d l y h h g x f d l v q d o v a l v 1 Z k d v x v h g w e h l w s u r j u h v l y h u d h l q v k h p r g h u q s u r f h w q r z d s s h d u d v s a l v u q d d v p / d v k u h d w v l a g l y l g x d o d x v r q p | d a g g l i i h u h q f h 1 V k h v h s u l q f l s d h r i g l j q l v / d a g z r u l k d u h q r a q j h u g l v a d q w l a g h d a > v k h k d y h f r p h w v k h l u i x a e h l a j q r w l q v s l v r i e x w e h f d x v h r i v k h y h d v d p h p r g h u q v a l v v k d w s u r p r v n g v k h p d v v k h f r p p r q j r r g 1

Dft xlvf hqf h/ hyhq w vkh srlqwr i dffhslaj qhr dlvh dlvkhj h p r q l / lv qr w q h f h w d l d v l j q r l a g l i i h u h q f h / q r u r i g h f d l l a j s r d l f d o

frp p xqlvhw/ exwri vhoŕfrp p daggaj glwaf h iurp sxedf diidlu vkdw
gr qrwfrqf huq p | dxwqr p | dag p | gliihuhqf h1 Lqvwduqf h dag
lqglj qdwr q duvh iurp d vhaq ri lqmwlf h dag z hahqhw/ qrwiurp
khj hprqlf surrhf w1 P r u d } d m r q d a g p h g l d m r q r i s r d m f v k r x a g
qrweh vnhq vlp sđ dvixqf vlr qdodohuq d m y h v w l q v m h w ŕ e d v h g l w x h v d a g
frqidf w1 S d u d l w p d l e h v k l v w r r / e x w d q r v k h u s d u w r i v k h s k h q r p h q r q
lv v k h s h u s h v d o f r q i d f w e h v z h h q d x w q r p | d a g g l i i h u h q f h 1 F r q u d f v d o
irup v ri jryhuq d a f h d u h / d a e h l w a d j h q d q l a x v l r q / d a v r v l p e r d f
u h r j q l v r q r i v k h y d o x h r i d j h q f | d v d s u q f l s c h r i n a w m l f d m r q l q
f r q v m p s r u d l v r f l h v l 1 U h v m d a q f h i l q d a q / v k r x a g q r w e h v h h q r q d d v
f r x q v m ŕ s r z h u w n h s v k h h d f v h g l q d a g l w v k r x a g e h v h h q l q v k h
f r q v m w r i n a w m l f d m r q d v d z k r d h l q v m p v r i l w v x e w a q f h / q r w r q d l w
irup 1 E x w k l v l v v k h w s l f i r u d q r v k h u s d s h u l

Qr vhw

⁴ R i v h q l j q r u h g l v ^ k h i d f w v k d w k l v z d v d a q j s u r f h w u d f k l a j ^ l w f r p s d m r q h y h q
l q z h v h u q H x u r s h r q d t x l v h u f h q v l 1 l r u h f d p s d v z r p h q j d l a q h g v k h d j k w w y r v h l q
q d m r q d o h d n f v r q v l q l u d a f h l q 4 < 7 8 1 V s d l q d a g S r u x j d o e h f d p h g h p r f u d f l h v r q d d i v m u
4 < 8 1

⁵ D v l p l a d u h j x a d u v r i s r d f l a j v k h v r f l d o r u g h u j h q h u d a q z d v r e v h y h g e l D g d p V p l v k
z k r / l q k l v ŕ ŕ h f v k u h v r q M u l v s u x g h q f h ŕ ŕ p s d u h g S d u v d a g O r a g r q l q v k l v z d j =
ŕ ŕ v k l a j v a g v v r p x f k w f r u x s w p d a n l a g d v g h s h a g h a f | / z k l d l a g h s h a g h a f | v k a o
l a f u d h v v k h k r q h w y r i s h r s d h ŕ ŕ v k h u p d l q v r i v k h i x g d o p d a q h u d a g g h s h a g h a f l h v
h f s a d l q v k d w ŕ ŕ S d u v z l v k d a d j h q x p e h u r i s r d f h v f d u f h d q l j k w k d s s h a q z l v k r x w
v r p h e r g l e h l a j n l a g h z / z k h u d v l q v k h a d j h u f l v y r i O r a g r q v k l v r f f x w r q d d i h z
v l p h v l q d | h d u d a k r x j k v k h q x p e h u r i s r d f h l v p x f k v p d a h u ŕ A / p l v k / 4 : : 2 4 < 5 / s 1
7 ; 9 , 1

⁶ P r q v m t x l h x - 4 : 8 ; , / G h ŕ ŕ v s u l w g h v a l v / e r r n [L f k d s 1 7 = ŕ ŕ v l v d q h u l u q d o h f s h u l h a f h
v k d w d a q p d a z k r z l h a g v s r z h u l v d n h d w d e x v h l w k h z l a o s u f h n g x q l o k h h a f r x q v m u
d p l w l z k r z r x a g k d y h j x h w h g B H y h q y l u x h q h g v d p l w l l i s r z h u l v q r w w e h d e x v h g /
v k l a j v p x w e h d u d a j h g v r v k d w s r z h u f k h f n v s r z h u ŕ ŕ T x r v h g e l U r v d a y d a r q + 5 3 3 ; /
Q r v h 9 , 1

⁷ P d w ŕ r f l h v y v k h r u l z d v l a j o x h a f h g e l v k h J h u p d a l q v a d f v d o • p l j u v w v k h X V D
e h i r u h d a g d w v k h e h j l a q l a j r i v k h V h f r a g Z r u a g Z d u h v s h f l d a q e l p p h e h u r i v k h
l u d a n i x u w V f k r r o d a g v k h L q v m x v h i r u V r f l d o U h v d u f k / h w a d e d v k h g w f r q l a q x v k h l u
z r u l q D p h u l f d + V / p d a q 4 < ; 7 , 1 V k h p r w z l g h d u h d p d w ŕ r f l h v y v k h r u l w / U l h y p d a
d a g P l a w / z h u D p h u l f d a q d a g k a g D p h u l f d a u r r w d v z h a ŕ q r v a d e d V k r u w l a q Y h e d q
d a g v k h S u d j p d m w / r i z k r p M k a G h z h l z d v l p s r u d a q w i r u P l a w / d a g J h r y K h u e h u
P h a g ŕ l q v m u d f v r q l w v r f l d o s v l f k r a j j i r u U l h y p d a 1 V k h l u f u l v f d o d z d u h a n w r i v k h
s u h v a q w z d v f x u r x v d e d f n z d u g ŕ r n l a j 1 P l a w g l a q r v h g v k h l u f r q v m p s r u d l
D p h u l f d a v r f l h v y d v ŕ y h u d y h a r s h g ŕ ŕ h u k) P l a w / 4 - 8 7 , / h y h q ŕ r w p r g h u q ŕ ŕ P l a w /
4 < 8 < / s 1 4 9 9 / s 1 4 ; 6 , 1 D a k r x j k U l h y p d a g h f a d h g k l p v h o i u h r i y d o x m a g j p h q w / k l v

ghvf uvlwv q ri r vkhu gluhf vlog ÓqvlghQgr shwlvu.Ó glyxq hv d surirxqg glvdnh iru vkhlu wlyl dovlwlv +Ulhp dq/ 4<83/ s1635, 1

⁸ Er aadqvl dgg Vke yhq w4<<<25339, fkdsvluw LY dgg YL Vkh uhi huf h lq vkh f dvh ri Vkh r f udlf vrf lthlv lv w VdlqvDxj xwlvh1Kxp dq z r uik ghulyaj iurp i dp lq d qdaj h lv vkh irxqgdvtr q ri gr p hwl vrf lthlv dv ghv f uehg el Od Exj huh lq 49; ; 1Vkh p r ghor i vrf lthlv ri kr q r u r r i rslqlr q/ lv vlnh q iurp Vkr p dv Kreehv/ dgg vkh vrf lthlv lq z klfk kxp dq z r uik lv dwhvwhg el r qhÓ thadlv q w vkh vryuhlj q -f lylf vrf lthlv, uhi h w UrxwxdxÓ sklar vskj ri vkh vrfldo f r qvdl v Vkh r ssv vlv q ehvz hñq lqgxwldo vrf lthlv/ dgg p dnhv r uhqvlv f dslv dvp lv lqvsluhg el YhedhQ glwqlf vtr q ehvz hñq sur gxf hu dgg suhgdlw up hqvdlv/ 1

⁹ Vkh hglwvuj dyh Ulhp dqÓ er n lw vlvh/ Vkh Q r qhQ Fur z g/ q r vxvwh lq vkh vlv v l Exwlv lv d j r r g vlvh iru vkh f r qvhw d q j z d j 1

: Vkh r qg Ylv wldq f r qf hswri f kdulf vlu ehf dp h udp sdqwlq Dp huf dq f ulv f do vrfldo vkr xj kwlg vkh sr wlv duj hdu1Lvz dv z lghvshdg lq svl fkr d q d q v l f do vlv d u x h d a h d g j / v l q f h Vlj p x q g l u h x g Ó x v h r i v k h v l u p d v k h x u q r i v k h f h q w u j 1 Lw l q w r g x f v r q w r v r f l d o v k h r u j r z h v p x f k w H u l f k l u r p p / z k r l q d q h d u j s d s h u + l u r p p / 4<6521<<4d, z d v v k h i l u w w r d s s q l u h x g l d q s v l f k r d q d q v l v w r v r l r a j j / l q v x e r n f w p d w h u q r d h v s u r p l q h q w k d q v k h v s l d w r i f d s l v d v p 1

: Ulhp dqÓ glwqlf vtr q ehvz hñq z r unlqj Ó a d w d q g p l g g d h Ó a d w f k d u l f v l u w u h y h u e h u d l v l q Vkr u w l h q YhedhQ d q d q v l v r i s u r g x f h u d q g s u h g d l w u p h q v d l v h v 1 YhedhQ +4; <<21<94, k d g d j x h g v k d w s u r g x f h u r k d y h v k h Ó q w l q f w r i z r u n p d q v k l s / Ó d q l q f d q d m r q v k d w g h y h a r s v d w h u l q k x p d q h y r o x l r q v k d q v k h l q w l q f w r i d s s u r s u d m r q / v l q f h l w l q y r g y h v f u h d m r q d q g d h d q l q j 1

< Vklv srlqwkdv ehñq p d g h a d m u l q f u l v l v p r i E r x u g l h x Ó d q d q v l v r i v k h Ó l q w l d q w d q d h v k h m l v Ó r i z r u n l q j Ó a d w f x a x u h / d v Ó l u a x p d g h r x w r i q h f h w l v p Ó e l J h u k d u g V f k x g h +4<<5, 1K h d j x h v v k d w k h l p p h g l d l v v a l v d f v l r q r q h j h w / i r u h f d p s d h i u r p v k h h i r u d h w z r u n l q j Ó a d w f r l d e d v l v + l h p j w l f k n l w z l l v k e h h u g u q n l q j / v l p s d h v r d g i r r g / d q g v r q j v l v d i d u i u r p q h f h w l v p d v f d q e h t

⁴³ Ulhp dq xvhw vkh vlvup Ó h h u j u r x s v Ó i r u v k h f r a d h f v l y l v l h v r i f r p s d l v r q / P d i i h v r d f d a v v k h p w l e h v 1 E r v k w l h w v k h y r o x q v l d q f k r v h q t x d d v l r i v x f k f r a d h f v l y l v l h v / d v z h a d d v v k h i d h n l q j v x s h u l f l d d v l z l v k z k l f k v k h j f r p p l w v k h a j d a v r i v k h l u p h p e h v + g h v s l v p P d i i h v r d Ó p l v d h d l q j v l u p , 1

⁴⁴ Vhyhudo d x v k r w p d l q v l l q v k d w k h p l g g d f a d w l v l q i d f w k h s u q f l s d o v x s s r u w r i v k h z h a d h v a l v d j d l q w q h r Ó e h u d o s r d v l v + h v s l q j Ó d q g h u h q / 4<<3> R a v r q / 4<<3, 1 l x u k h u p r u h / v h y h u d o w a g l h v l g g l f d l v v k d w k h g h z v r f l d o p r y h p h q w Ñ d q w l q x f d h d l i h p l q l w h q y l u r q p h q w a f d d u j l r q d o d q g h k q l f N a h p d l q d v x s s r u w h g e l q h z p l g g d h Ó f a d w j u r x s v / h v s h f l d a t l q l u d a f h + E l g r x h w d d f 4<6> P r q r d u g h w) E h q j x l j x l / 4<5> W x u d l q h / 4<9; , e x w d a r l q r v k h u H x u s h d q f r x q w l h v + Ó d k v) X u j / 4<; > R i i h / 4<8> N u h v / 4<; < , 1 L q j d h k d u w 4<; : / 4<; < , h y h q v x j j h w v k d w k h d i o x h q w p l g g d f a d w z r x q g w a q v k h e a x u l q j f a d w Ó e d v h g s r d v l d o v l v l p r q d q h z f r x u w z l v k v z r d i w l q w l d g r i r q h = v k h w a d g l v r q d o z r u n l q j Ó a d w p d v l u d d w d h i w d q g d q h z d i v k w d w s u r p x g d l v v k h y d o x h r i s r w l p d v l u d d v p 1 H p s l u f d o u h v h d f k s a d u l f f r q i l u v v k l v k j s r v k h l v + R i i h / 4<8> N u h v / 4<; < / d a k r x j k v k h u a d m r q v k l s v e h v z h ñ q f a d w / s a d u l d a g s r w Ó p d v l u d d v p v h n p w e h t x l v l f r p s d h + Z h a n d h p / 4<<4, 1 V k h u h d u h v r p h q h z p l g g d h Ó f a d w j u r x s v z k r s a d u l f l s a l v l q s u r j u h w l y h p r y h p h q w d a g r u j d a l d m r q v / e x w r v k h u v f r x q g q r v f d h d h w r u z r x q g e h r s h a q k r v k h w v k h p 1

⁴⁵ Vkrp dv l udqn +5337, jlyhv dq h{fhathqwdqg ghvldng ghvfulsvr q ri vkh nlqg ri lqglj qdwr q vkdwUlhpv dq uhihuv w/ lq klv errn r q frqwp srudl Dp hulf dq ElehOehov frqhvuydwp lq klv errn Z kdvd vkh P dwhuuzlvk Ndqvdl

⁴⁶ Vklv vkhp h lv forvh w Krunkhlp huO vkhrj ri udfnhw +Vf kp lg Qrhu/ 5335,/ exuhdxfulm daj rj daj}hg j urxsv zlvk qr lghdri vkh vrfllhv/ dv dz kr dv/ r qd sxuxlqj vkhlu sduf xadu lqvuuhw/ ru survwj urxsv zlvk qr fhdv dlp v z kdwr hyhu +vrgd z h z rxag vshdri vkh OvuhhvQ1Lq dz lghuvhqvh/ vkh frqf hswri ghf hqwd}hg vrfllhv/ kdveh hq lp sr uadwq adlv vz hqvlhv f hqvu/ Hxur shd q vrfldov l hqf h dvhuuuh vxk dv Riuh +4< 8,/ Odk) Xu j +4< :./ dag Er oadqvl) Fkl dshar +5338, 1Lq d gliihuhqz d/ vkh glwr oxlr q ri srz hu lq adlv prghu q vrfllhv/ dsshdv lq vkh qhr d rxf dxgl d q dvhuuuhv/ iruh{ dp sdh el Qlnr adv Ur v h +4<<<, 1

Uhihuhqf hv

Dgr uqr / Wl +5337, 1Vkh Mij r q ri Dxvkhqwl l v/ 1hg1N1Vduz vnl dag l 1 Z l adOr qgr q=Ur xv h g j h) Nhj dq Saxol +Ruj l qdoz r un sxedvkhg 4<97, 1

Dgr uqr / WZ 1 l uhqnhaEuxqvz l f n/ H1/ Ohyl qvr q/ G1) Vdqi r ug/ U1Q1 +4<83, 1Vkh Dxvr ulvdl d q Shuvr qddv1Qhz \ r un=Kdushu Eur vkhu1

Dssdgxudl/ D1+4<< : , 1P r ghudlv dwOdj h1Fxo xudoGlp hqvlr qv ri J a edd}dwr q1P lqghdsr dv=Xqlyhu l v/ ri P lqghv vdl Shw1

Duhqgv/K1+4< : 6, 1Vkh Ruj lqv ri Wv d vdl d q l v p 1Vd q Gilh j r / Qhz \ r un dag Or qgr q=Kd f r xwEudf h M ydqr ylf k1+Ruj l qdoz r un sxedvkhg 4<84, 1

Ehaok/ U1Q1 Wswr q/ V1 Vxadyd q/ Z 1) Vz lghu/ D1+4< : 8, 1Kdelw ri vkh Khdu1Lqglylgxddvp dag Fr p p l v h qwl q Dp hulf dq Qih1 Ehunhdj =Xqlyhu l v/ ri Fddir uqld Shw1

Elgr x/ F1 Gd j qdxg/ P 1 Gxulh/ E1Lr q/ M1 P hkd G1 Slq r q f kdur w P 1) Wlf duw/ MS1+4< : 6, 1Chv f r x f khv p r | hqghv vdlul •hv1 P r v d t x h v r f l r j l t x h 1 Sdlv=P l q l w u h g h d X u e d q l v d h h w g x Or j hp hqv

Er oadqvl/ O1) Fkl dshar / H1+5338, 1Vkh Qhz Vsluwr i Fdsvldvp 1^Ch q r xyhohvsulwgx f dslvldvp h 1Wdqvdl el J uhj r u/ Hadr w Or qgr q= Yhu r 1

Er oadqvl/ O1) V k • y h q r w O 1 + 5 3 3 9 , 1 R q M k w i l f d w r q 1 H f r q r p l h v r i Z r u k 1 W d q v 1 F d k h u q h S r u h u l Q h z M h u h l = S u q f h w r q X q l y h u l v / S h w 1 + R u j l q d o z r u n s x e d v k h g 4 < < < , 1

Er uf k/ F1+5339, 1Vkh H{ f oxlr q ri vkh Fur z g1Vkh Ghwlaq| ri d

Lqyhuqdmr qdodqg P xalglvf lsdqduj Mlxuqdor i VrfldoVf l hqf hv 4+4, 5:

Vrf l r r j l f d o l i j x u h r i v k h l u d m r q d o l h x u r s h d q M l x u q d o r i V r f l d o

Vkhr ul / <+4, / ; 604351

Er xuglhx/ S1+4<; 7, 1Glwlqf vlr q1D VrfldoFulvtxhri Mkgj phqwr i Vdwlh

+U1Qlf h/ Wldqv1, 1Or qgr q=Ur xwngj h1+Rulj lqdoz r un sxedvkhg

4<: 7, 1

Exulv/ Y1+4<; 9, 1Vkh Glvfyryhul ri vkh Qhz P lggdh FdwlVkhru l d qg

Vrf l h v / 48+6, / 64: 067<1

Fdunh/ M/ J hz luy/ V1) P f Odxj kdq/ H1+5333, 1Uhlqyhqlqj vkh

Z h o d u h V d w l l q M F d u n h / V 1 J h z l u y) H 1 P f O d x j k d q + H g v 1 /

Qhz P d q d j h u l d d v p / Q h z Z h o d u h B + s s 1 4 0 5 9 , 1 O r q g r q = R s h q

Xqlyhuwlv Suhw d qg V d j h 1

Fudz ir ug/ D1+4<; 3, 1Vwxqghur q vkh Ulj kv1Qhz \ r un=Sdqvkhr q1

Gdko/ U1+4<94, 1Z kr J r y h u q v B G h p r f u d f | d q g S r z h u l q d q D p h u l f d q

F l v 1 Q h z K d y h q / F W \ d d h X q l y h u w l v S u h w 1

Ghdnx} h/ J 1+4<9; , 1Glii•uqf h h w u s • v m r q 1 S d u v = S u h w h v

Xqlyhuwlv l u h v g h l u d f h 1

gx J d l / S1+5333, 1HqwhshqghxuldoJ r y h u q d q f h d q g S x e d f P d q d j h p h q w

Vkh D q w l E x u h d x f u d w 1 l q M F d u n h / V 1 J h z l u y) H 1 P f O d x j k d q

+Hgv1/ Qhz P d q d j h u l d d v p / Q h z Z h o d u h B + s s 1 9 5 0 , 4 , 1 O r q g r q =

Rshq Xqlyhuwlv Suhw d qg V d j h 1

Gxunkhlp / ..1+4<; 7, 1Vkh Glylvir q ri Oder xulq Vrf l h v +Z 1G1Kdow/

Wldqv1, 1Edmaji wvnh=P df p l o d q 1 + R u l j l q d o z r u n s x e d v k h g

4; <6, 1

Howhu/ M+Hg1, 1+4<<; , 1Ghdehuchlyh Ghp r f u d f | +Fdp eulgj h Vxglhv lq

vkh Vkhru l ri Ghp r f u d f | , 1Fdp eulgj h=Fdp eulgj h Xqlyhuwlv

Suhw1

Hvslaj O d q g h u h q / J 1 + 4 < < 3 , 1 V k h V k u h h Z r u g v r i Z h o d u h F d s l v d d v p 1

F d p e u l g j h = S r d v l S u h w 1

Hvylr ql/ D1+4<<; , 1Vkh qhz j r qghq uxh=f r p p xqlv d qg p r u d d v l q d

ghp r f u d f v r f l h v 1 Q h z \ r u n = E d m f E r r n v 1

l d o n / S 1 + 4 < < 7 , 1 V k h F r q v x p l a j E r g l 1 O r q g r q = V d j h 1

l u d q n / W 1 + 5 3 3 7 , 1 Z k d v v k h P d w h u z l v k N d q v d B K r z F r q v h u y d v y h v

Z r q v k h K h d u r i D p h u l f d 1 Q h z \ r u n = K h q l K r o d a g F r 1

l u r p p / H 1 + 4 < < 4 d , 1 F u l v v r i S v f k r d q d v l v 1 Q h z \ r u n = K 1 K r o l

+Rulj lqdoz r un sxedvkhg 4<65, 1

5; Vxoxqhq 0D vkuchdwz uhsuhvhwvwyh ghp r f udf |

I ur p p / H1+4<<4e, 1VKh I hdu r i l uhgr p 1Or qgr q=Ur xwngj h1
+Rulj lqdoz r un sxedvkhg 4<74, 1

J huk/ K1) P lœw/ F1Z 1+4<87, 1Fkdudf vhu d qg Vr f l do Vwxf vxuh1
Or qgr q=Ur xwngj h d qg Nhj d q Sdxol

Kdehup dv/ M+4<<9, 1Ehvz hhq l df w d qg Qr up v1Fr qwlexvr qv w d
Glvr xuw Vkh r u l ri Odz d qg Ghp r f udf | 1Fdp eulgj h/ P D=
Fdp eulgj h Xqlyhuwvψ Suhw1

Laj d hkdw/ U1+4< : , 1VKh VdhqWUhyr œvr q1Sulqf hwr q=Sulqf hwr q
Xqlyhuwvψ Suhw1

Laj d hkdw/ U1+4< ; , 1Fxoœuh Vklw l q Dgydqf hg Lqgxwul do Vr f l hlv/1
Sulqf hwr q=Sulqf hwr q Xqlyhuwvψ Suhw1

Nr uqkœxvu/ Z 1+4<93, 1VKh Sr d w f v r i P dw Vr f l hlv/1Or qgr q=
Ur xwngj h d qg Nhj d q Sdxol

Nulhv/ K1+4< ; , 1Qhz vr f l dop r yhp hq w d qg vkh qhz f œw l q vkh
Qhvkhu d qg v1Dp hulf d q Mxugdor i Vr f l r œ j | / <7+8, / 43: ; 044491

Odf œx/ H1) P r xii h/ F1+4< ; 8, 1Khj hp r q l d qg Vr f l d d w Ww d v h j | =
wz dugv d Udg l f do Ghp r f u d w f Sr d w f v1+Z 1P r r u h) S1
Fdp p df n/ W d q v1, 1Or qgr q=Yhuwr 1

Odvk/ V1) Xu l / M+4< ; , 1VKh Hqg r i Ruj d q l } hg F d s l w d v p 1
Fdp eulgj h= Sr d vψ Suhw1

Olsvhw/ V1P 1+4<93, 1VKh Sr d w f do P d q1Qhz \ r un=Dqf kr u Err nv1
Oxn hv/ V1+5338, 1Sr z hu=d Udg l f do Y l h z 1Kr xqgp l œw=Sœj udyh

P df p lœdq1+Rulj lqdoz r un sxedvkhg 4< : 7, 1

P diihr d/ P 1+4<<7, 1VKh Vlp h r i vkh W l ehv 0VKh Ghf d qh r i
Lqgylgxd d v p l q P dw Vr f l hlv/1Or qgr q=Vœj h1

P diihr d/ P 1+4<<9, 1Fr qvhp sœvr q r i vkh z r uœg ilj xuhv r i fr p p xqlw
wv d h1P lq qh d s r d v=Xqlyhuwvψ r i P lq qh v r œ Suhw1

P f F œ l / Z 1+4<<7, 1P dw h u h w1Vhœ d qg Vr f l hlv/ l q P r gh u q Dp hulf d1
Fkdsho Klœ d qg Or qgr q=Vkh Xqlyhuwvψ r i Qr u l k Fœ d r d qd Suhw1

P lœw/ F1Z 1+4<8<, 1VKh Vr f l r œ j l f do l p d j l q d w r q1Qhz \ r un=R{ i r u g
Xqlyhuwvψ Suhw1

P r q r d u g h w / G1) Ehqj x l j x l / J 1+4< ; 5, 1Oxw s l h j h w r q q d l u h 0 d h v
f r x f kh v p r | h q q h v1Uhyx h i u d qf d l v h gh vr f l r œ j l h / 56+7, / 9380
9691

P r xii h/ F1+5338, 1VKh Ghp r f u d w f Sdudgr { 1Or qgr q=Yhuwr 1

LqVnuqdvMr qdodqg P xalglvflsdqduj Mxuqdor i VrfldoVf l hqf hv 4+4, 5<

Qhz p dq/ M+5333, 1Eh| r qg vkh Qhz Sxedf P dgdj hp hqvBP r ghuql} lqj
Sxedf Vhuylf hv1Lq MFaduh/ V1J hz luy/ dqg H1P f Qdxj kdq
+Hgv1/ Qhz P dgdj hulddvp / Qhz ZhoduhB+ss178094, 1Or qgr q=
Rshq Xqlyhuwlv Suhw dqg Vqj h1

RHFG +4<<8, 1J ryhuqdaq h lq WdqvMr q1Sxedf P dgdj hp hqvUhir up v
lq RHFG Fr xqwlhv1Sdlv=Dxvkr ul

RHFG +5335, 1Sxedf Vhf wru P r ghuqlvMr q=D Qhz Dj hagd1H{ hf xvlyh
Vxp pduj 1J RY2SXP D/ 51

Riih/ N1+4<; 8, 1Glvr uj dql}hg Fdsldvp 1Fr qvnp sr uduj
Wdqvir up dMr qv ri Zrun dqg Sr dWf v1Or qgr q=Sr dWf Suhw1
Rowr q/ V1+4<<3, 1VrfldoSr df| dqg Zhoduh Wdvh lq Vz hghq1Dunly
i oedj =Oxqg1

Sxwqdp / U1G1+5333, 1Er z daj Dar qh=Wkh Fr andsvh dqg Uhylydor i
Dp hulf dq Fr p p xqlv1Qhz \ run=Vp r q dqg Vf kxwlu

Ulhvp dq/ G1+4<83, 1Vkh Or qhd Fur z g1D Vxgl ri vkh Fkdaj lqj
Dp hulf dq Fkduf vlu Qhz KdvhqA dth Xqlyhuwlv Suhw1

Ur vdaqdar q/ S1+533; , 1Fr xqvwu N Ghf p r f udf | 1Sr dWf v Lq Dq Dj h Ri
Glwvwxwlv Wdqv1DukxuJ r qgkdp p hulf Dp eulgj h=Fdp eulgj h
Xqlyhuwlv Suhw1

Ur vr/ Q1+4<<<, 1Sr z huv ri l uhgr p 1Uhiudp lqj sr dWf dovkr xj kwf
Fdp eulgj h=Fdp eulgj h Xqlyhuwlv Suhw1

Vf kp lg Qr hu/ J 1+Hg1, 1+5335, 1Hglvr uD Di vuz r ug1Lq W1Z 1Dgr uqr)
P 1Kr unkhlp hu Vkh Gldhf Wf ri Hqdj kvhqp hqv1Skla vr sklf do
l udj p hqw +H1Mskf r wv Wdqv1, +ss154: 057: , 1Vdqir ug=Vdqir ug
Xqlyhuwlv Suhw1+Ru1j lqdoz run sxedvkhg 4<7: , 1

Vf kxg h/ J 1+4<<5, 1Hudheqlvj hvhaof kdiw Nxauxur } l r o j l h ghu
J hj hqz dWf l udnixuwp P dlq dqg Qhz \ run=Fdp sxv Yhuaj 1
Vlp p ho J 1+4<<3, Vkh Skla vr sk| ri P r qh| +5gg hg1 W1Er wv p r h)
G1l lve| / Wdqv1, 1Or qgr q=Ur xvahg h1+Ru1j lqdoz run sxedvkhg
4<33, 1

Vp lvk/ D1+4<; 5, 1Chf wuhv r q Mkuvsuxghqf h/ hgv U1D1P hhn/ G1G1
Udsdkhodqg SU 1Wv1q1Lqgl dqs d v=Clahu/ l xqg1+Ru1j lqdo
z run sxedvkhg 4: ; , 1

Vxonxqh/ S1+4<<5, 1Vkh Hxur shdq Qhz P lggd Fdw1Lqglylgxddv dqg
Wledvdp lq P dw Vrf l h v1Dqghuwr wDyhexu1

63 Vxoxqhq/ 0D vkuchdwzr uhsuhvhwvwyh ghp r f udf |

Vxoxqhq/ S1+533<, 1VKh Vdwxudvng Vrf lhw/1Uhj xadlvaj Qi hwl/dh dgg
Ulvn lq Fr qvxp hu Fxoxuh1Or qgr q=Vdj h1

Vxoxqhq/ S1+5343, 1Dj hqf | dgg Sr z hul VKh Fr qwdf wdoLaxvtr q1
Hxur shdq Mxuxdor i FxoxudoVxglhv/ 46/ 7<808431

Vxoxqhq/ S1+5344, 1Dxwqr p | dj dlqwlqvlp df | 1Rq vkh Sur edhp ri
J r yhuqlqj Qi hwl/dhUhadvng Ulvnn1Vtr v/ 489/ <<04451

VKhuer uq/ J 1+4<<8, 1Hxur shdq P r ghulv/ dgg Eh| r qg1VKh Vdrhf wul
ri Hxur shdq Vrf lhwlv 4<78053331Or qgr q=Vdj h1

Wqp dq/ U1+4<; 7, 1F1Z ulj kwP lœ1D Qdwyh Dp hulf dq dgg Kl v
Dp hulf dq Lqvlhdf wdoUr r w1Xqlyhuwlv/ Sdu dgg Or qgr q=VKh
Shqqv/ q/dqld Vvln Xqlyhuwlv/ Suhw1

Vxudlqh/ D1+4<9; , 1Ch prxyhp hqwgx p dl r x dh fr p p xqlvp h xwslt xh1
Sduv=Vhxl d1

Vxudlqh/ D1+4<; 7, 1Ch uhw xu gh ddf vxul Sduv=l dj dug1

Yhedq/ V1+4<94, 1VKh VKhruj ri vkh Chlvxuh Fœw1Qhz \ r un=VKh
P r ghua Qeudj 1+Ruj lqdoz r un sxedvkhg 4; <<, 1

Z hndhdp / G1O1+4<<4, 1VKh vz r dni wBRff xsdvr q dgg sdw/ f kr lf h lq
l udf h/ Lvdq dgg vkh Qhvkhuoqgv1Dp hulf dq Mxuxdor i
Vrf l r ōj | / <9+9, / 65: 06941

